



NEL-0001 Sequence Listing.txt
SEQUENCE LISTING

<110> The Minister of National Defence, Government of Canada
Nagata, Leslie P
Wong, Jonathon P

<120> Novel DNA-Based Vaccine Against the Encephalitis Alphaviruses

<130> NEL-001

<140> 10/023,649
<141> 2001-12-21

<150> 60/256,948
<151> 2000-12-21

<160> 7

<170> PatentIn version 3.1

<210> 1
<211> 11484
<212> DNA
<213> Western equine encephalomyelitis virus - strain 71V-1658

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<221> CDS
<222> (25)..(7428)
<223> 5' UTR <1 .. 24

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<221> CDS
<222> (7473)..(11183)
<223> encodes nucleocapsid, E3, E2, 6K and E1 proteins

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Ala Asp Ser Pro Tyr Val Lys Ser Leu Gln Arg Thr Phe Pro Gln Phe
10 15 20 25

gag atc gaa gca agg cag gtc act gac aat gac cat gcc aat gcc aga 147
Glu Ile Glu Ala Arg Gln Val Thr Asp Asn Asp His Ala Asn Ala Arg
30 35 40

gcg ttt tcg cat gtg gca aca aag ctc att gag agc gaa gtc gac cgg 195
Ala Phe Ser His Val Ala Thr Lys Leu Ile Glu Ser Glu Val Asp Arg
45 50 55

gac caa gtt atc ttg gac att gga agt gcg ccc gtc aga cat gca cat 243
Asp Gln Val Ile Leu Asp Ile Gly Ser Ala Pro Val Arg His Ala His
60 65 70

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Ser Asn His Arg Tyr His Cys Ile Cys Pro Met Ile Ser Ala Glu Asp
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ccg gac aga cta caa cgg tat gca gaa aga ctt aag aaa agt gac att 339
Page 1

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Ser	Thr	Pro	Asp 125	Ala	Glu	Thr	Pro	Ser 130	Leu	Cys	Met	His	Thr 135	Asp	Ala	
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Thr	Cys	Arg 140	Tyr	Phe	Gly	Ser	Val 145	Ala	Val	Tyr	Gln	Asp 150	Val	Tyr	Ala	
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Val	His 155	Ala	Pro	Thr	Ser	Ile 160	Tyr	His	Gln	Ala	Leu 165	Lys	Gly	Val	Arg	
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Thr	Tyr	Val	Pro	Ala 335	Thr	Leu	Cys	Asp	Gln	Met 340	Thr	Gly	Ile	Leu	Ala 345	

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cgt Arg	gaa Glu 395	cat His	cgt Arg	gcc Ala	gac Asp	ttg Leu 400	gac Asp	gag Glu	aaa Lys	gaa Glu 405	cta Leu	ggg Gly	gtg Val	cgg Arg		1251
gag Glu 410	cg Arg	act Thr	ctt Leu	act Thr	atg Met 415	ggc Gly	tgc Cys	tgc Cys	tgg Trp	gct Ala 420	ttc Phe	aag Lys	acc Thr	cag Gln	aaa Lys 425	1299
atc Ile	aca Thr	tcc Ser	atc Ile	tac Tyr 430	aag Lys	aag Lys	cct Pro	ggg Gly	acg Thr 435	caa Gln	aca Thr	att Ile	aag Lys	aaa Lys 440	gta Val	1347
cct Pro	gcc Ala	gtc Val	ttt Phe 445	gac Asp	tca Ser	ttt Phe	gtg Val	att Ile 450	cca Pro	cg Arg	ctt Leu	acc Thr	agc Ser 455	cac His	ggg Gly	1395
ctc Leu	gat Asp	atg Met 460	ggc Gly	ttc Phe	cg Arg	cgt Arg	agg Arg 465	ctc Leu	aag Lys	ctg Leu	ctg Leu	ctt Leu 470	gaa Glu	cca Pro	act Thr	1443
gtc Val	aaa Lys 475	ccc Pro	gca Ala	ccg Pro	gct Ala	att Ile 480	aca Thr	atg Met	gcc Ala	gat Asp	gtg Val 485	gag Glu	cat His	ctg Leu	cgt Arg	1491
ggc Gly 490	tta Leu	cag Gln	caa Gln	gaa Glu	gct Ala 495	gaa Glu	gaa Glu	gtg Val	gct Ala	gca Ala 500	gcg Ala	gaa Glu	gag Glu	atc Ile	aga Arg 505	1539
gaa Glu	gcc Ala	ctg Leu	cca Pro	ccc Pro 510	ttg Leu	ctc Leu	cct Pro	gaa Glu	ata Ile 515	gaa Glu	aaa Lys	gag Glu	acc Thr	gta Val 520	gag Glu	1587
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aaa Lys 570	ctg Leu	gcg Ala	tgt Cys	atc Ile	cac His 575	cca Pro	ttg Leu	gcg Ala	gaa Glu	caa Gln 580	gta Val	ctg Leu	gta Val	atg Met	act Thr 585	1779
cac His	aaa Lys	ggg Gly	agg Arg	gca Ala 590	ggg Gly	aga Arg	tac Tyr	aaa Lys	gtc Val 595	gag Glu	cca Pro	tac Tyr	cac His	ggg Gly 600	aag Lys	1827

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aga tac ctg cac cac atc gca atc aac gga gga gcg cta aac act gac	1971
Arg Tyr 635 Leu His His Ile Ala 640 Ile Asn Gly Gly Ala 645 Leu Asn Thr Asp	
gaa gag tac tat aag act gta aag act cag gac aca gac tca gaa tac	2019
Glu Glu Tyr Tyr Lys 655 Val Lys Thr Gln Asp 660 Thr Asp Ser Glu 665 Tyr	
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Val Phe Asp Ile 670 Asp Ala Arg Lys Cys Val 675 Lys Arg Glu Asp Ala 680 Gly	
ccc ttg tgc cta acc ggt gat ctg gta gat cca cca ttt cac gag ttt	2115
Pro Leu Cys 685 Leu Thr Gly Asp Leu Val 690 Asp Pro Pro Phe 695 His Glu Phe	
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Ala Tyr 700 Glu Ser Leu Lys Thr Arg 705 Pro Ala Ala Pro His 710 Lys Val Pro	
acc atc gga gtc tat gga gtg cca ggt tca ggt aaa tct gga atc atc	2211
Thr Ile 715 Gly Val Tyr Gly Val 720 Pro Gly Ser Gly Lys 725 Ser Gly Ile Ile	
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Lys Ser Ala Val Thr 735 Lys Lys Asp Leu Val 740 Ser Ala Lys Lys Glu 745	
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Asn Cys Ala Glu 750 Ile Ile Arg Asp Val Arg 755 Arg Met Arg Arg 760 Met Asp	
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Val Ala Ala Arg 765 Thr Val Asp Ser Val 770 Leu Leu Asn Gly Val 775 Lys His	
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Pro Val Asn Thr Leu Tyr Ile Asp 785 Glu Ala Phe Ala Cys 790 His Ala Gly	
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Thr Leu 795 Leu Ala Leu Ile Ala 800 Ile Val Lys Pro Lys 805 Lys Val Val Leu	
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Cys Gly Asp Pro Lys 815 Gln Cys Gly Phe Phe Asn 820 Met Met Cys Leu Lys 825	
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acc tgt ttc aga gga tgg gtg aaa cag cta cag att gac tac aaa aat Thr Cys Phe Arg Gly Trp Val Lys Gln Leu Gln Ile Asp Tyr Lys Asn 890 895 900 905			2739
cac gaa atc atg act gcg gct gca tcg caa gga ctt acg cgg aaa ggc His Glu Ile Met Thr Ala Ala Ser Gln Gly Leu Thr Arg Lys Gly 910 915 920			2787
gtt tat gct gtc agg tac aaa gtc aac gag aat cca ctc tac tcg cag Val Tyr Ala Val Arg Tyr Lys Val Asn Glu Asn Pro Leu Tyr Ser Gln 925 930 935			2835
act tct gag cac gtg aac gtg tta ctt aca cgc aca gaa aaa cgc att Thr Ser Glu His Val Asn Val Leu Leu Thr Arg Thr Glu Lys Arg Ile 940 945 950			2883
gtc tgg aag acg cta gct ggt gat ccc tgg ata aag aca ctt aca gct Val Trp Lys Thr Leu Ala Gly Asp Pro Trp Ile Lys Thr Leu Thr Ala 955 960 965			2931
aaa tat ccc ggg gat ttc acg gct tca ttg gac gac tgg cag cgc gaa Lys Tyr Pro Gly Asp Phe Thr Ala Ser Leu Asp Asp Trp Gln Arg Glu 970 975 980 985			2979
cac gac gcc att atg gca cgc gtt ctt gat aag ccg cag aca gct gat His Asp Ala Ile Met Ala Arg Val Leu Asp Lys Pro Gln Thr Ala Asp 990 995 1000			3027
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cca gtc ttg gcc acg gcc aac att gtg ctg acg aga cag cag tgg Pro Val Leu Ala Thr Ala Asn Ile Val Leu Thr Arg Gln Gln Trp 1020 1025 1030			3117
gag acg ttg cac cca ttc aag cat gac aga gcg tac tca cct gaa Glu Thr Leu His Pro Phe Lys His Asp Arg Ala Tyr Ser Pro Glu 1035 1040 1045			3162
atg gca ctg aac ttc ttt tgc acc agg ttc ttt gga gta gac ctg Met Ala Leu Asn Phe Phe Cys Thr Arg Phe Phe Gly Val Asp Leu 1050 1055 1060			3207
gac agt ggg tta ttt tcc gct cct acc gtc gca ctt act tac agg Asp Ser Gly Leu Phe Ser Ala Pro Thr Val Ala Leu Thr Tyr Arg 1065 1070 1075			3252
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Thr	Ile	Lys	Asp	Tyr	Ser	Pro	Thr	Ile	Asn	Val	Val	Pro	Leu	Asn	
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aca	act	gat	cac	agc	gga	ttc	cta	tct	aag	atg	aag	ggc	aaa	tct	3522
Thr	Thr	Asp	His	Ser	Gly	Phe	Leu	Ser	Lys	Met	Lys	Gly	Lys	Ser	
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His	His	Leu	Asn	Thr	Gly	Gly	Thr	Cys	Val	Ala	Ile	Gly	Tyr	Gly	
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Leu	Ala	Asp	Arg	Ala	Thr	Glu	Asn	Ile	Ile	Thr	Ala	Val	Ala	Arg	
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Tyr	Gln	Gly	Ser	Thr	Arg	Tyr	Glu	Ala	Gly	Arg	Ala	Pro	Ala	Tyr	
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aga	gtg	atc	aga	ggt	gac	att	agc	aag	agc	gct	gac	caa	gct	atc	4062
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ggt	aat	gct	gct	aat	agc	aaa	ggt	caa	cca	ggt	tcc	gga	gtg	tgc	4107
Val	Asn	Ala	Ala	Asn	Ser	Lys	Gly	Gln	Pro	Gly	Ser	Gly	Val	Cys	
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ggt	gca	ctg	tac	cga	aaa	tgg	ccg	gct	gct	ttt	gat	aga	cag	cca	4152
Gly	Ala	Leu	Tyr	Arg	Lys	Trp	Pro	Ala	Ala	Phe	Asp	Arg	Gln	Pro	
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ata	gct	gtc	ggg	acg	gct	aga	ctt	gtg	aag	cac	gaa	ccg	ctc	atc	4197
Ile	Ala	Val	Gly	Thr	Ala	Arg	Leu	Val	Lys	His	Glu	Pro	Leu	Ile	
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ata	cat	gct	gta	gga	ccc	aat	ttt	tct	aag	atg	ccg	gaa	ccg	gag	4242
Ile	His	Ala	Val	Gly	Pro	Asn	Phe	Ser	Lys	Met	Pro	Glu	Pro	Glu	
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ggc	gac	ctt	aag	ctc	gca	gct	gcc	tac	atg	agc	ata	gcg	tcc	atc	4287
Gly	Asp	Leu	Lys	Leu	Ala	Ala	Ala	Tyr	Met	Ser	Ile	Ala	Ser	Ile	
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Val	Asn	Ala	Glu	Arg	Ile	Thr	Lys	Ile	Ser	Val	Pro	Leu	Leu	Ser	
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His	His	Leu	Phe	Thr	Ala	Phe	Asp	Thr	Thr	Asp	Ala	Asp	Val	Thr	
			1455					1460					1465		
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Ile	Tyr	Cys	Leu	Asp	Lys	Gln	Trp	Glu	Thr	Arg	Ile	Ile	Glu	Ala	
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Ile	His	Arg	Lys	Glu	Ser	Val	Glu	Ile	Leu	Asp	Asp	Asp	Lys	Pro	
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gta	gac	att	gac	ttg	gtc	agg	gtc	cac	cca	aac	agc	tct	ttg	gca	4557
Val	Asp	Ile	Asp	Leu	Val	Arg	Val	His	Pro	Asn	Ser	Ser	Leu	Ala	
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Gly	Arg	Pro	Gly	Tyr	Ser	Val	Asn	Glu	Gly	Lys	Leu	Tyr	Ser	Tyr	
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Leu	Glu	Gly	Thr	Arg	Phe	His	Gln	Thr	Ala	Lys	Asp	Ile	Ala	Glu	
			1530					1535					1540		
atc	cat	gca	atg	tgg	ccc	aac	aaa	tct	gag	gct	aat	gag	cag	att	4692
Ile	His	Ala	Met	Trp	Pro	Asn	Lys	Ser	Glu	Ala	Asn	Glu	Gln	Ile	
			1545					1550					1555		
tgc	ttg	tac	atc	ctg	ggg	gag	agt	atg	tcc	agc	atc	cgc	tcc	aaa	4737
Cys	Leu	Tyr	Ile	Leu	Gly	Glu	Ser	Met	Ser	Ser	Ile	Arg	Ser	Lys	
			1560					1565					1570		

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tgc cca gta gag gag tca gag gcg tct gct cca cct cac aca ctt	4782
Cys Pro Val Glu Glu Ser Glu Ala Ser Ala Pro Pro His Thr Leu	
1575 1580 1585	
cca tgc ctg tgt aat tac gct atg acg gct gag cgc gta tac agg	4827
Pro Cys Leu Cys Asn Tyr Ala Met Thr Ala Glu Arg Val Tyr Arg	
1590 1595 1600	
ttg cgc tct gcg aag aaa gaa cag ttc gcc gta tgc tca tca ttc	4872
Leu Arg Ser Ala Lys Lys Glu Gln Phe Ala Val Cys Ser Ser Phe	
1605 1610 1615	
ctg ttg ccg aag tac agg atc aca ggc gtg cag aag cta cag tgc	4917
Leu Leu Pro Lys Tyr Arg Ile Thr Gly Val Gln Lys Leu Gln Cys	
1620 1625 1630	
agc aaa cca gtc ctg ttt tca ggc gtc gta cca ccg gct gta cac	4962
Ser Lys Pro Val Leu Phe Ser Gly Val Val Pro Pro Ala Val His	
1635 1640 1645	
ccc agg aag tac gcg gaa ata att cta gaa acg cca cca ccg cca	5007
Pro Arg Lys Tyr Ala Glu Ile Ile Leu Glu Thr Pro Pro Pro Pro	
1650 1655 1660	
gca acg aca acc gta ata tgt gaa cca act gtg cca gaa cgt ata	5052
Ala Thr Thr Thr Val Ile Cys Glu Pro Thr Val Pro Glu Arg Ile	
1665 1670 1675	
ccc agt ccg gtg att tct aga gca cca agt gcg gaa tca ctg cta	5097
Pro Ser Pro Val Ile Ser Arg Ala Pro Ser Ala Glu Ser Leu Leu	
1680 1685 1690	
tcg ctt ggc ggc gtc tcg ttc tct agc tct gcc aca cgc tcg tca	5142
Ser Leu Gly Gly Val Ser Phe Ser Ser Ser Ala Thr Arg Ser Ser	
1695 1700 1705	
acc gcc tgg agc gac tat gac agg cgg ttt gtg gtt aca gct gat	5187
Thr Ala Trp Ser Asp Tyr Asp Arg Arg Phe Val Val Thr Ala Asp	
1710 1715 1720	
gtg cat caa gcg aac acg tct acg tgg agc atc cct agt gct cct	5232
Val His Gln Ala Asn Thr Ser Thr Trp Ser Ile Pro Ser Ala Pro	
1725 1730 1735	
ggc ttg gac gtc cag ctg cct tct gac gtc act gat tcc cac tgg	5277
Gly Leu Asp Val Gln Leu Pro Ser Asp Val Thr Asp Ser His Trp	
1740 1745 1750	
agt att cca agt gca tca ggc ttt gaa gtg aga aca cca tct gta	5322
Ser Ile Pro Ser Ala Ser Gly Phe Glu Val Arg Thr Pro Ser Val	
1755 1760 1765	
cag gac cta act gcg gag tgt gcg aag cct cgt gga ctg gcc gaa	5367
Gln Asp Leu Thr Ala Glu Cys Ala Lys Pro Arg Gly Leu Ala Glu	
1770 1775 1780	
ata atg caa gac ttc aat act gct cct ttc cag ttt ctt tcg gac	5412
Ile Met Gln Asp Phe Asn Thr Ala Pro Phe Gln Phe Leu Ser Asp	
1785 1790 1795	
tac aga cca gta ccg gca cca cgg aga cgc ccc atc cca tca cct	5457
Tyr Arg Pro Val Pro Ala Pro Arg Arg Arg Pro Ile Pro Ser Pro	

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1800				1805				1810							
aga	tcg	acg	gct	tcc	gca	cct	cca	gtt	cca	aag	cca	cgc	agg	act	5502
Arg	Ser	Thr	Ala	Ser	Ala	Pro	Pro	Val	Pro	Lys	Pro	Arg	Arg	Thr	
			1815					1820				1825			
aag	tac	caa	caa	cca	cca	gga	gtc	gct	aga	gcg	atc	tca	gaa	gcg	5547
Lys	Tyr	Gln	Gln	Pro	Pro	Gly	Val	Ala	Arg	Ala	Ile	Ser	Glu	Ala	
			1830					1835				1840			
gag	ttg	gac	gag	tac	atc	cgt	caa	cac	tcc	aac	tga	cgg	tat	gaa	5592
Glu	Leu	Asp	Glu	Tyr	Ile	Arg	Gln	His	Ser	Asn		Arg	Tyr	Glu	
			1845					1850						1855	
gcg	gga	gcg	tat	att	ttc	tca	tcg	gaa	aca	ggc	caa	ggt	cac	ctt	5637
Ala	Gly	Ala	Tyr	Ile	Phe	Ser	Ser	Glu	Thr	Gly	Gln	Gly	His	Leu	
			1860					1865						1870	
caa	cag	aaa	tca	gta	cgt	caa	tgt	aaa	cta	caa	gaa	cct	ata	ttg	5682
Gln	Gln	Lys	Ser	Val	Arg	Gln	Cys	Lys	Leu	Gln	Glu	Pro	Ile	Leu	
			1875					1880						1885	
gat	cgg	gcc	gtc	cat	gag	aag	tat	tac	gcc	ccg	cgc	ctc	gat	ctc	5727
Asp	Arg	Ala	Val	His	Glu	Lys	Tyr	Tyr	Ala	Pro	Arg	Leu	Asp	Leu	
			1890					1895						1900	
gaa	aga	gag	aaa	atg	tta	cag	aag	aaa	ctg	caa	tta	tgc	gcc	tct	5772
Glu	Arg	Glu	Lys	Met	Leu	Gln	Lys	Lys	Leu	Gln	Leu	Cys	Ala	Ser	
			1905					1910						1915	
gaa	gga	aat	aga	agc	agg	tat	caa	tca	cga	aaa	gta	gaa	aat	atg	5817
Glu	Gly	Asn	Arg	Ser	Arg	Tyr	Gln	Ser	Arg	Lys	Val	Glu	Asn	Met	
			1920					1925						1930	
aaa	gca	att	aca	gcg	gag	cga	ctc	att	tct	gga	ttg	ggc	aca	tat	5862
Lys	Ala	Ile	Thr	Ala	Glu	Arg	Leu	Ile	Ser	Gly	Leu	Gly	Thr	Tyr	
			1935					1940						1945	
cta	tca	tca	gaa	gtg	aat	cct	gtc	gag	tgt	tac	aga	gtc	aat	tat	5907
Leu	Ser	Ser	Glu	Val	Asn	Pro	Val	Glu	Cys	Tyr	Arg	Val	Asn	Tyr	
			1950					1955						1960	
cct	gta	cca	atc	tac	tcg	tca	acg	gta	att	aac	agg	ttt	aca	tct	5952
Pro	Val	Pro	Ile	Tyr	Ser	Ser	Thr	Val	Ile	Asn	Arg	Phe	Thr	Ser	
			1965					1970						1975	
gca	gag	gtc	gcg	gtt	aaa	acg	tgc	aac	tta	gtt	atc	caa	gag	aat	5997
Ala	Glu	Val	Ala	Val	Lys	Thr	Cys	Asn	Leu	Val	Ile	Gln	Glu	Asn	
			1980					1985						1990	
tac	cct	aca	gta	gcc	agt	tat	tgt	ata	aca	gat	gaa	tac	gat	gcg	6042
Tyr	Pro	Thr	Val	Ala	Ser	Tyr	Cys	Ile	Thr	Asp	Glu	Tyr	Asp	Ala	
			1995					2000						2005	
tat	ctt	gac	atg	gtg	gac	ggc	gca	tcg	tgc	tgt	cta	gat	aca	gcc	6087
Tyr	Leu	Asp	Met	Val	Asp	Gly	Ala	Ser	Cys	Cys	Leu	Asp	Thr	Ala	
			2010					2015						2020	
act	ttt	tgt	ccg	gct	aaa	ctg	aga	agc	tac	cca	aag	aag	cat	agc	6132
Thr	Phe	Cys	Pro	Ala	Lys	Leu	Arg	Ser	Tyr	Pro	Lys	Lys	His	Ser	
			2025					2030						2035	
tat	ttg	cag	cca	gag	ata	aga	tca	gcc	gtc	cca	tcg	cct	ata	cag	6177

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Tyr	Leu	Gln	Pro	Glu	Ile	Arg	Ser	Ala	Val	Pro	Ser	Pro	Ile	Gln	
				2040					2045					2050	
aat	aca	tta	caa	aat	gta	ttg	gct	gca	gct	act	aaa	agg	aat	tgc	6222
Asn	Thr	Leu	Gln	Asn	Val	Leu	Ala	Ala	Ala	Thr	Lys	Arg	Asn	Cys	
				2055					2060					2065	
aac	gtt	acc	caa	atg	cga	gaa	tta	cct	gtc	tta	gat	tcg	gcg	gca	6267
Asn	Val	Thr	Gln	Met	Arg	Glu	Leu	Pro	Val	Leu	Asp	Ser	Ala	Ala	
				2070					2075					2080	
ttt	aat	gtt	gat	tgt	ttc	aag	aaa	tac	gca	tgc	aat	gat	gag	tac	6312
Phe	Asn	Val	Asp	Cys	Phe	Lys	Lys	Tyr	Ala	Cys	Asn	Asp	Glu	Tyr	
				2085					2090					2095	
tgg	gat	acc	ttt	cgc	gat	aac	cct	att	cgg	cta	act	aca	gag	aac	6357
Trp	Asp	Thr	Phe	Arg	Asp	Asn	Pro	Ile	Arg	Leu	Thr	Thr	Glu	Asn	
				2100					2105					2110	
gtt	acg	caa	tat	gtg	aca	aag	ctg	aaa	ggg	ccg	aaa	gca	gca	gca	6402
Val	Thr	Gln	Tyr	Val	Thr	Lys	Leu	Lys	Gly	Pro	Lys	Ala	Ala	Ala	
				2115					2120					2125	
ttg	ttt	gcg	aat	act	cat	aat	cta	aaa	ccg	ttg	cag	gag	ata	cca	6447
Leu	Phe	Ala	Asn	Thr	His	Asn	Leu	Lys	Pro	Leu	Gln	Glu	Ile	Pro	
				2130					2135					2140	
atg	gat	caa	ttc	gtc	atg	gat	cta	aag	aga	gat	gtc	aaa	gtt	act	6492
Met	Asp	Gln	Phe	Val	Met	Asp	Leu	Lys	Arg	Asp	Val	Lys	Val	Thr	
				2145					2150					2155	
ccc	ggc	acg	aaa	cat	aca	gag	gag	cgg	cct	aag	gtg	cag	gtt	att	6537
Pro	Gly	Thr	Lys	His	Thr	Glu	Glu	Arg	Pro	Lys	Val	Gln	Val	Ile	
				2160					2165					2170	
cag	gct	gca	gat	ccc	ctt	gct	acc	gct	tac	ctt	tgc	ggg	atc	cat	6582
Gln	Ala	Ala	Asp	Pro	Leu	Ala	Thr	Ala	Tyr	Leu	Cys	Gly	Ile	His	
				2175					2180					2185	
cgg	gaa	tta	gtc	cgt	aga	ctg	aat	gcg	gtg	ctt	ctg	cca	aat	atc	6627
Arg	Glu	Leu	Val	Arg	Arg	Leu	Asn	Ala	Val	Leu	Leu	Pro	Asn	Ile	
				2190					2195					2200	
cat	act	ctc	ttc	gac	atg	tca	gcg	gaa	gat	ttt	gat	gcg	att	att	6672
His	Thr	Leu	Phe	Asp	Met	Ser	Ala	Glu	Asp	Phe	Asp	Ala	Ile	Ile	
				2205					2210					2215	
gct	gaa	cat	ttc	cac	cac	ggc	gac	cca	gta	ttg	gaa	acg	gac	atc	6717
Ala	Glu	His	Phe	His	His	Gly	Asp	Pro	Val	Leu	Glu	Thr	Asp	Ile	
				2220					2225					2230	
gcg	tcg	ttt	gat	aaa	agc	gaa	gac	gac	gct	atc	gcc	att	tcg	gcg	6762
Ala	Ser	Phe	Asp	Lys	Ser	Glu	Asp	Asp	Ala	Ile	Ala	Ile	Ser	Ala	
				2235					2240					2245	
ttg	atg	atc	ctt	gag	gac	tta	ggt	gtc	gac	caa	ccg	ctc	tta	gat	6807
Leu	Met	Ile	Leu	Glu	Asp	Leu	Gly	Val	Asp	Gln	Pro	Leu	Leu	Asp	
				2250					2255					2260	
ttg	ata	gag	gcg	gcg	ttc	ggc	aat	atc	aca	tct	gtg	cac	cta	cct	6852
Leu	Ile	Glu	Ala	Ala	Phe	Gly	Asn	Ile	Thr	Ser	Val	His	Leu	Pro	
				2265					2270					2275	

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aca gga acg agg ttt	aaa ttt ggt gcc atg	atg aaa tcc ggt atg	6897
Thr Gly Thr Arg Phe	Lys Phe Gly Ala Met	Met Lys Ser Gly Met	
	2280	2285 2290	
ttc tta acg ctg ttt	gtc aac aca cta gtc	aat atc atg att gct	6942
Phe Leu Thr Leu Phe	Val Asn Thr Leu Val	Asn Ile Met Ile Ala	
	2295	2300 2305	
agc aga gta cta cgt	gaa cgg tta acc acg	tca gcg tgc gcg gcc	6987
Ser Arg Val Leu Arg	Glu Arg Leu Thr Thr	Ser Ala Cys Ala Ala	
	2310	2315 2320	
tct atc ggc gac gat	aac ata gtg cat ggt	gtc gtc tcc gac acc	7032
Ser Ile Gly Asp Asp	Asn Ile Val His Gly	Val Val Ser Asp Thr	
	2325	2330 2335	
ttg atg gcg gag aga	tgc gcc act tgg ctg	aac atg gaa gta aaa	7077
Leu Met Ala Glu Arg	Cys Ala Thr Trp Leu	Asn Met Glu Val Lys	
	2340	2345 2350	
att att gat gca gtt	att ggt atc aaa gca	ccc tac ttc tgt ggg	7122
Ile Ile Asp Ala Val	Ile Gly Ile Lys Ala	Pro Tyr Phe Cys Gly	
	2355	2360 2365	
gga ttt atc ctg gtg	gac cag ata aca ggc	aca gcc tgc aga gtc	7167
Gly Phe Ile Leu Val	Asp Gln Ile Thr Gly	Thr Ala Cys Arg Val	
	2370	2375 2380	
gca gac cct cta aaa	agg ctt ttt aag ctt	gga aaa cca ttg cca	7212
Ala Asp Pro Leu Lys	Arg Leu Phe Lys Leu	Gly Lys Pro Leu Pro	
	2385	2390 2395	
gtc gat gat acc caa	gac tgc gac cgc cgc	cgg gca ctg cat gat	7257
Val Asp Asp Thr Gln	Asp Cys Asp Arg Arg	Arg Ala Leu His Asp	
	2400	2405 2410	
gaa gca atg cga tgg	aac aga att gga att	acg gac gag tta gtg	7302
Glu Ala Met Arg Trp	Asn Arg Ile Gly Ile	Thr Asp Glu Leu Val	
	2415	2420 2425	
aag gcc gta gaa tcc	aga tac gag atc ata	ctg gca ggc ctg atc	7347
Lys Ala Val Glu Ser	Arg Tyr Glu Ile Ile	Leu Ala Gly Leu Ile	
	2430	2435 2440	
atc acg tct ctg tcc	acg tta gcc gaa agc	gtt aag aac ttc aag	7392
Ile Thr Ser Leu Ser	Thr Leu Ala Glu Ser	Val Lys Asn Phe Lys	
	2445	2450 2455	
agc ata aga ggg agc	cca atc acc ctc tac	ggc tga cctaaatagg	7438
Ser Ile Arg Gly Ser	Pro Ile Thr Leu Tyr	Gly	
	2460	2465	
tgacgtagta gacacgcacc	tacccaccgg caga atg	ttt cca tac cct cag	7490
		Met Phe Pro Tyr Pro Gln	
		2470	
ctg aac ttt cca cca	gtt tac cct aca aat	ccg atg gct tac cga	7535
Leu Asn Phe Pro Pro	Val Tyr Pro Thr Asn	Pro Met Ala Tyr Arg	
	2475	2480 2485	
gat cca aac cct cct	agg cgc cgc tgg agg	ccg ttt cgg ccc ccg	7580
Asp Pro Asn Pro Pro	Arg Arg Arg Trp Arg	Pro Phe Arg Pro Pro	
	2490	2495 2500	

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ctg gct gct caa atc gaa gat ctt agg agg tcg ata gtc aac ttg	7625
Leu Ala Ala Gln Ile Glu Asp Leu Arg Arg Ser Ile Val Asn Leu	
2505 2510 2515	
act ttc aaa caa cga tca cct aat ccg ccg cca ggt cca ccg cca	7670
Thr Phe Lys Gln Arg Ser Pro Asn Pro Pro Pro Gly Pro Pro Pro	
2520 2525 2530	
aag aag aag aag agt gct cct aag cca aaa cct act cag cct aaa	7715
Lys Lys Lys Lys Ser Ala Pro Lys Pro Lys Pro Thr Gln Pro Lys	
2535 2540 2545	
aag aag aag cag caa gcc aag agg acg aaa cgc aag cct aaa cca	7760
Lys Lys Lys Gln Gln Ala Lys Arg Thr Lys Arg Lys Pro Lys Pro	
2550 2555 2560	
ggg aaa cga caa cgt atg tgt atg aag ttg gag tcg gac aag aca	7805
Gly Lys Arg Gln Arg Met Cys Met Lys Leu Glu Ser Asp Lys Thr	
2565 2570 2575	
ttt ccg atc atg ctg aac ggc caa gtg aat gga tat gcc tgc gtt	7850
Phe Pro Ile Met Leu Asn Gly Gln Val Asn Gly Tyr Ala Cys Val	
2580 2585 2590	
gtc gga gga agg ctg atg aaa cca ctc cac gtt gaa gga aaa att	7895
Val Gly Gly Arg Leu Met Lys Pro Leu His Val Glu Gly Lys Ile	
2595 2600 2605	
gat aat gag caa tta gcg gcc gtg aaa ttg aag aag gct agc atg	7940
Asp Asn Glu Gln Leu Ala Ala Val Lys Leu Lys Lys Ala Ser Met	
2610 2615 2620	
tac gac ttg gag tac ggc gac gtt ccc cag aac atg aaa tca gac	7985
Tyr Asp Leu Glu Tyr Gly Asp Val Pro Gln Asn Met Lys Ser Asp	
2625 2630 2635	
acg ctg cag tac acc agc gac aaa cca ccg ggc ttc tac aac tgg	8030
Thr Leu Gln Tyr Thr Ser Asp Lys Pro Pro Gly Phe Tyr Asn Trp	
2640 2645 2650	
cac cac ggc gca gtc cag tat gag aat ggg aga ttt acc gta ccg	8075
His His Gly Ala Val Gln Tyr Glu Asn Gly Arg Phe Thr Val Pro	
2655 2660 2665	
aga gga gtg ggc ggg aaa ggc gac agc gga aga ccg atc ctg gac	8120
Arg Gly Val Gly Gly Lys Gly Asp Ser Gly Arg Pro Ile Leu Asp	
2670 2675 2680	
aac aga ggc aga gtt gtg gct att gtt cta gga ggt gca aat gag	8165
Asn Arg Gly Arg Val Val Ala Ile Val Leu Gly Gly Ala Asn Glu	
2685 2690 2695	
ggc acg cgt acg gcg ctt tca gtg gtc act tgg aac cag aaa ggg	8210
Gly Thr Arg Thr Ala Leu Ser Val Val Thr Trp Asn Gln Lys Gly	
2700 2705 2710	
gtg acc att agg gat acc ccc gaa ggt tct gaa ccg tgg tca cta	8255
Val Thr Ile Arg Asp Thr Pro Glu Gly Ser Glu Pro Trp Ser Leu	
2715 2720 2725	
gtt aca gcg cta tgc gtg ctt tcg aat gtc acg ttc cca tgc gac	8300
Val Thr Ala Leu Cys Val Leu Ser Asn Val Thr Phe Pro Cys Asp	

2740

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Ala	Ser	Gly	Glu	Val	Tyr	Ile	Lys	Pro	Pro	Ser	Gly	Lys	Asn	Val	
		2970					2975					2980			
acc	tac	gaa	tgt	aag	tgt	ggc	gac	tac	agc	aca	ggc	atc	gtg	agc	9065
Thr	Tyr	Glu	Cys	Lys	Cys	Gly	Asp	Tyr	Ser	Thr	Gly	Ile	Val	Ser	
		2985					2990					2995			
acg	cga	acg	aag	atg	aac	ggc	tgc	act	aaa	gca	aaa	cag	tgc	att	9110
Thr	Arg	Thr	Lys	Met	Asn	Gly	Cys	Thr	Lys	Ala	Lys	Gln	Cys	Ile	
		3000					3005					3010			
gcc	tac	aag	agc	gac	caa	acg	aaa	tgg	gtc	ttc	aac	tcg	ccg	gat	9155
Ala	Tyr	Lys	Ser	Asp	Gln	Thr	Lys	Trp	Val	Phe	Asn	Ser	Pro	Asp	
		3015					3020					3025			
ctt	att	agg	cac	aca	gac	cac	tca	gtg	caa	ggc	aaa	ttg	cac	att	9200
Leu	Ile	Arg	His	Thr	Asp	His	Ser	Val	Gln	Gly	Lys	Leu	His	Ile	
		3030					3035					3040			
cca	ttc	cgc	ttg	aca	ccg	aca	gtc	tgc	ccg	gtt	ccg	tta	gct	cac	9245
Pro	Phe	Arg	Leu	Thr	Pro	Thr	Val	Cys	Pro	Val	Pro	Leu	Ala	His	
		3045					3050					3055			
acg	cct	aca	gtc	acg	aag	tgg	ttc	aaa	ggc	atc	acc	ctc	cac	ctg	9290
Thr	Pro	Thr	Val	Thr	Lys	Trp	Phe	Lys	Gly	Ile	Thr	Leu	His	Leu	
		3060					3065					3070			
act	gca	atg	cga	cca	aca	ttg	ctg	aca	acg	aga	aaa	ttg	ggg	ctg	9335
Thr	Ala	Met	Arg	Pro	Thr	Leu	Leu	Thr	Thr	Arg	Lys	Leu	Gly	Leu	
		3075					3080					3085			
cga	gca	gac	gca	aca	gca	gaa	tgg	att	aca	ggg	tct	aca	tcc	agg	9380
Arg	Ala	Asp	Ala	Thr	Ala	Glu	Trp	Ile	Thr	Gly	Ser	Thr	Ser	Arg	
		3090					3095					3100			
aat	ttt	tct	gtg	ggg	cga	gaa	ggg	ctg	gag	tac	gta	tgg	ggc	aac	9425
Asn	Phe	Ser	Val	Gly	Arg	Glu	Gly	Leu	Glu	Tyr	Val	Trp	Gly	Asn	
		3105					3110					3115			
cat	gaa	cca	gtc	aga	gtc	tgg	gcc	cag	gag	tcg	gca	cca	ggc	gac	9470
His	Glu	Pro	Val	Arg	Val	Trp	Ala	Gln	Glu	Ser	Ala	Pro	Gly	Asp	
		3120					3125					3130			
cca	cat	gga	tgg	ccg	cat	gag	atc	atc	atc	cac	tat	tat	cat	cgg	9515
Pro	His	Gly	Trp	Pro	His	Glu	Ile	Ile	Ile	His	Tyr	Tyr	His	Arg	
		3135					3140					3145			
cat	cca	gtc	tac	act	gtc	att	gtg	ctg	tgt	ggc	gtc	gct	ctt	gct	9560
His	Pro	Val	Tyr	Thr	Val	Ile	Val	Leu	Cys	Gly	Val	Ala	Leu	Ala	
		3150					3155					3160			
atc	ctg	gta	ggc	act	gca	tca	tca	gca	gct	tgc	atc	gcc	aaa	gca	9605
Ile	Leu	Val	Gly	Thr	Ala	Ser	Ser	Ala	Ala	Cys	Ile	Ala	Lys	Ala	
		3165					3170					3175			
aga	aga	gac	tgc	ctg	acg	cca	tac	gcg	ctt	gca	ccg	aac	gca	acg	9650
Arg	Arg	Asp	Cys	Leu	Thr	Pro	Tyr	Ala	Leu	Ala	Pro	Asn	Ala	Thr	
		3180					3185					3190			
gta	ccc	aca	gca	tta	gcg	gtt	ttg	tgc	tgc	att	cgg	cca	acc	aac	9695
Val	Pro	Thr	Ala	Leu	Ala	Val	Leu	Cys	Cys	Ile	Arg	Pro	Thr	Asn	
		3195					3200					3205			

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gct gaa aca ttt gga gaa act ttg aac cat ctg tgg ttt aac aac	9740
Ala Glu Thr Phe Gly Glu Thr Leu Asn His Leu Trp Phe Asn Asn	
3210 3215 3220	
caa ccg ttt ctc tgg gca cag ttg tgc att cct ctg gca gcg ctt	9785
Gln Pro Phe Leu Trp Ala Gln Leu Cys Ile Pro Leu Ala Ala Leu	
3225 3230 3235	
gtt att ctg ttc cgc tgc ttt tca tgc tgc atg cct ttt tta ttg	9830
Val Ile Leu Phe Arg Cys Phe Ser Cys Cys Met Pro Phe Leu Leu	
3240 3245 3250	
gtt gca ggc gtc tgc ctg ggg aag gta gac gcc ttc gaa cat gcg	9875
Val Ala Gly Val Cys Leu Gly Lys Val Asp Ala Phe Glu His Ala	
3255 3260 3265	
acc act gtg cca aat gtt ccg ggg atc ccg tat aag gcg ttg gtc	9920
Thr Thr Val Pro Asn Val Pro Gly Ile Pro Tyr Lys Ala Leu Val	
3270 3275 3280	
gaa cgc gca ggt tac gcg cca ctt aac ctg gag atc acg gtc gtc	9965
Glu Arg Ala Gly Tyr Ala Pro Leu Asn Leu Glu Ile Thr Val Val	
3285 3290 3295	
tca tcg gaa tta aca cct tca act aac aag gag tac gtg acc tgc	10010
Ser Ser Glu Leu Thr Pro Ser Thr Asn Lys Glu Tyr Val Thr Cys	
3300 3305 3310	
aaa ttc cac aca gtc att cct tca cca caa gtt aaa tgc tgc ggg	10055
Lys Phe His Thr Val Ile Pro Ser Pro Gln Val Lys Cys Cys Gly	
3315 3320 3325	
tcc ctc gag tgc aag gca tcc tca aag gcg gat tac aca tgc cgc	10100
Ser Leu Glu Cys Lys Ala Ser Ser Lys Ala Asp Tyr Thr Cys Arg	
3330 3335 3340	
gtt ttt ggc ggt gtg tac cct ttc atg tgg gga ggc gca caa tgc	10145
Val Phe Gly Gly Val Tyr Pro Phe Met Trp Gly Gly Ala Gln Cys	
3345 3350 3355	
ttc tgt gac agt gag aac aca caa ctg agt gag gcg tac gtc gag	10190
Phe Cys Asp Ser Glu Asn Thr Gln Leu Ser Glu Ala Tyr Val Glu	
3360 3365 3370	
ttc gct cca gac tgc act ata gat cac gca gtc gca cta aaa gtt	10235
Phe Ala Pro Asp Cys Thr Ile Asp His Ala Val Ala Leu Lys Val	
3375 3380 3385	
cac aca gct gct ctg aaa gtc ggc ctg cgt ata gta tac ggc aac	10280
His Thr Ala Ala Leu Lys Val Gly Leu Arg Ile Val Tyr Gly Asn	
3390 3395 3400	
acc acc gcg cac ctg gat acg ttt gtc aat ggc gtc acg cca ggt	10325
Thr Thr Ala His Leu Asp Thr Phe Val Asn Gly Val Thr Pro Gly	
3405 3410 3415	
tcc tca cgg gac ctg aag gtc ata gca ggg ccg ata tca gcc gct	10370
Ser Ser Arg Asp Leu Lys Val Ile Ala Gly Pro Ile Ser Ala Ala	
3420 3425 3430	
ttt tca ccc ttt gac cat aag gtc gtc atc aga aag ggg ctt gtt	10415
Phe Ser Pro Phe Asp His Lys Val Val Ile Arg Lys Gly Leu Val	
3435 3440 3445	

NEL-0001 Sequence Listing.txt

tac aac tac gac ttc cct gag tat gga gct atg aaa cca gga gcg	10460
Tyr Asn Tyr Asp Phe Pro Glu Tyr Gly Ala Met Lys Pro Gly Ala	
3450 3455 3460	
ttc ggc gat att caa gca tcc tcg ctt gat gct aca gac ata gta	10505
Phe Gly Asp Ile Gln Ala Ser Ser Leu Asp Ala Thr Asp Ile Val	
3465 3470 3475	
gcc cgc act gac ata cgg ctg ctg aag cct tct gtc aag aac atc	10550
Ala Arg Thr Asp Ile Arg Leu Leu Lys Pro Ser Val Lys Asn Ile	
3480 3485 3490	
cac gtc ccc tac acc caa gca gta tca ggg tat gaa atg tgg aag	10595
His Val Pro Tyr Thr Gln Ala Val Ser Gly Tyr Glu Met Trp Lys	
3495 3500 3505	
aac aac tca gga cga ccc ctg caa gaa aca gca cca ttt gga tgt	10640
Asn Asn Ser Gly Arg Pro Leu Gln Glu Thr Ala Pro Phe Gly Cys	
3510 3515 3520	
aaa att gaa gtg gag cct ctg cga gcg tct aac tgt gct tac ggg	10685
Lys Ile Glu Val Glu Pro Leu Arg Ala Ser Asn Cys Ala Tyr Gly	
3525 3530 3535	
cac atc cct atc tcg att gac atc cct gat gca gct ttt gtg aga	10730
His Ile Pro Ile Ser Ile Asp Ile Pro Asp Ala Ala Phe Val Arg	
3540 3545 3550	
tca tca gaa tca cca aca att tta gaa gtt agc tgc aca gta gca	10775
Ser Ser Glu Ser Pro Thr Ile Leu Glu Val Ser Cys Thr Val Ala	
3555 3560 3565	
gac tgc att tat tct gca gac ttt ggt ggt tct cta aca tta cag	10820
Asp Cys Ile Tyr Ser Ala Asp Phe Gly Gly Ser Leu Thr Leu Gln	
3570 3575 3580	
tac aaa gct gac agg gag gga cat tgt cca gtt cac tcc cac tcc	10865
Tyr Lys Ala Asp Arg Glu Gly His Cys Pro Val His Ser His Ser	
3585 3590 3595	
acg aca gct gtt ttg aag gaa gcg acc aca cat gtg act gcc gta	10910
Thr Thr Ala Val Leu Lys Glu Ala Thr Thr His Val Thr Ala Val	
3600 3605 3610	
ggc agc ata aca cta cat ttt agc aca tcg agc cca caa gca aat	10955
Gly Ser Ile Thr Leu His Phe Ser Thr Ser Ser Pro Gln Ala Asn	
3615 3620 3625	
ttt ata gtt tcg cta tgc ggc aag aag tcc acc tgc aat gct gaa	11000
Phe Ile Val Ser Leu Cys Gly Lys Lys Ser Thr Cys Asn Ala Glu	
3630 3635 3640	
tgt aaa cca ccg gcc gac cac ata att gga gaa cca cat aaa gtc	11045
Cys Lys Pro Pro Ala Asp His Ile Ile Gly Glu Pro His Lys Val	
3645 3650 3655	
gac caa gaa ttc cag gcg gca gtt tcc aaa aca tct tgg aac tgg	11090
Asp Gln Glu Phe Gln Ala Ala Val Ser Lys Thr Ser Trp Asn Trp	
3660 3665 3670	
ctg ctt gca ctg ttt ggg gga gca tca tcc ctc att gtt gta gga	11135
Leu Leu Ala Leu Phe Gly Gly Ala Ser Ser Leu Ile Val Val Gly	

NEL-0001 Sequence Listing.txt

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3675                               3680       3685
ctt ata gtg  ttg gtc tgc agc tct  atg ctt ata aac aca  cgt aga  11180
Leu Ile Val  Leu Val Cys Ser Ser  Met Leu Ile Asn Thr  Arg Arg
3690                               3695       3700

tga ctgagcgcgg acactgacat agcggtaaaa ctcgatgtac ttccgaggaa  11233
gcgtggtgca taatgccacg cgccgcttga cactaaaact cgatgtatatt ccgaggaagc 11293
acagtgcata atgctgtgca gtgtcacatt aatcgtatat cacactacat attaacaaca 11353
ctatatcact tttatgagac tcactatggg tctctaatat acactacaca tattttactt 11413
aaaaacacta tacacacttt ataaattctt ttataatttt tcttttgttt ttattttgtt 11473
tttaaaattt c 11484

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<210> 2
<211> 1852
<212> PRT
<213> Western equine encephalomyelitis virus - strain 71V-1658
<400> 2

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Met Glu Arg Ile His Val Asp Leu Asp Ala Asp Ser Pro Tyr Val Lys
1           5           10
Ser Leu Gln Arg Thr Phe Pro Gln Phe Glu Ile Glu Ala Arg Gln Val
20          25          30
Thr Asp Asn Asp His Ala Asn Ala Arg Ala Phe Ser His Val Ala Thr
35          40          45
Lys Leu Ile Glu Ser Glu Val Asp Arg Asp Gln Val Ile Leu Asp Ile
50          55          60
Gly Ser Ala Pro Val Arg His Ala His Ser Asn His Arg Tyr His Cys
65          70          75          80
Ile Cys Pro Met Ile Ser Ala Glu Asp Pro Asp Arg Leu Gln Arg Tyr
85          90          95
Ala Glu Arg Leu Lys Lys Ser Asp Ile Thr Asp Lys Asn Ile Ala Ser
100         105         110
Lys Ala Ala Asp Leu Leu Glu Val Met Ser Thr Pro Asp Ala Glu Thr
115         120         125
Pro Ser Leu Cys Met His Thr Asp Ala Thr Cys Arg Tyr Phe Gly Ser
130         135         140
Val Ala Val Tyr Gln Asp Val Tyr Ala Val His Ala Pro Thr Ser Ile

```


NEL-0001 Sequence Listing.txt

Asp Asp Glu Lys Glu Leu Gly Val Arg Glu Arg Thr Leu Thr Met Gly
405 410 415

Cys Cys Trp Ala Phe Lys Thr Gln Lys Ile Thr Ser Ile Tyr Lys Lys
420 425 430

Pro Gly Thr Gln Thr Ile Lys Lys Val Pro Ala Val Phe Asp Ser Phe
435 440 445

Val Ile Pro Arg Leu Thr Ser His Gly Leu Asp Met Gly Phe Arg Arg
450 455 460

Arg Leu Lys Leu Leu Leu Glu Pro Thr Val Lys Pro Ala Pro Ala Ile
465 470 475 480

Thr Met Ala Asp Val Glu His Leu Arg Gly Leu Gln Gln Glu Ala Glu
485 490 495

Glu Val Ala Ala Ala Glu Glu Ile Arg Glu Ala Leu Pro Pro Leu Leu
500 505 510

Pro Glu Ile Glu Lys Glu Thr Val Glu Ala Glu Val Asp Leu Ile Met
515 520 525

Gln Glu Ala Gly Ala Gly Ser Val Glu Thr Pro Arg Gly His Ile Arg
530 535 540

Val Thr Ser Tyr Pro Gly Glu Glu Lys Ile Gly Ser Tyr Ala Ile Leu
545 550 555 560

Ser Pro Gln Ala Val Leu Asn Ser Glu Lys Leu Ala Cys Ile His Pro
565 570 575

Leu Ala Glu Gln Val Leu Val Met Thr His Lys Gly Arg Ala Gly Arg
580 585 590

Tyr Lys Val Glu Pro Tyr His Gly Lys Val Ile Val Pro Glu Gly Thr
595 600 605

Ala Val Pro Val Gln Asp Phe Gln Ala Leu Ser Glu Ser Ala Thr Ile
610 615 620

Val Phe Asn Glu Arg Glu Phe Val Asn Arg Tyr Leu His His Ile Ala
625 630 635 640

Ile Asn Gly Gly Ala Leu Asn Thr Asp Glu Glu Tyr Tyr Lys Thr Val
645 650 655

NEL-0001 Sequence Listing.txt

Lys Thr Gln Asp Thr Asp Ser Glu Tyr Val Phe Asp Ile Asp Ala Arg
 660 665 670
 Lys Cys Val Lys Arg Glu Asp Ala Gly Pro Leu Cys Leu Thr Gly Asp
 675 680 685
 Leu Val Asp Pro Pro Phe His Glu Phe Ala Tyr Glu Ser Leu Lys Thr
 690 695 700
 Arg Pro Ala Ala Pro His Lys Val Pro Thr Ile Gly Val Tyr Gly Val
 705 710 715 720
 Pro Gly Ser Gly Lys Ser Gly Ile Ile Lys Ser Ala Val Thr Lys Lys
 725 730 735
 Asp Leu Val Val Ser Ala Lys Lys Glu Asn Cys Ala Glu Ile Ile Arg
 740 745 750
 Asp Val Arg Arg Met Arg Arg Met Asp Val Ala Ala Arg Thr Val Asp
 755 760 765
 Ser Val Leu Leu Asn Gly Val Lys His Pro Val Asn Thr Leu Tyr Ile
 770 775 780
 Asp Glu Ala Phe Ala Cys His Ala Gly Thr Leu Leu Ala Leu Ile Ala
 785 790 795 800
 Ile Val Lys Pro Lys Lys Val Val Leu Cys Gly Asp Pro Lys Gln Cys
 805 810 815
 Gly Phe Phe Asn Met Met Cys Leu Lys Val His Phe Asn His Asp Ile
 820 825 830
 Cys Thr Glu Val Tyr His Lys Ser Ile Ser Arg Arg Cys Thr Gln Thr
 835 840 845
 Val Thr Ala Ile Val Ser Thr Leu Phe Tyr Asp Lys Arg Met Lys Thr
 850 855 860
 Val Asn Pro Cys Ala Asp Lys Ile Ile Ile Asp Thr Thr Gly Thr Thr
 865 870 875 880
 Lys Pro His Lys Asp Asp Leu Ile Leu Thr Cys Phe Arg Gly Trp Val
 885 890 895
 Lys Gln Leu Gln Ile Asp Tyr Lys Asn His Glu Ile Met Thr Ala Ala
 900 905 910

NEL-0001 Sequence Listing.txt

Ala Ser Gln Gly Leu Thr Arg Lys Gly Val Tyr Ala Val Arg Tyr Lys
915 920 925

Val Asn Glu Asn Pro Leu Tyr Ser Gln Thr Ser Glu His Val Asn Val
930 935 940

Leu Leu Thr Arg Thr Glu Lys Arg Ile Val Trp Lys Thr Leu Ala Gly
945 950 955 960

Asp Pro Trp Ile Lys Thr Leu Thr Ala Lys Tyr Pro Gly Asp Phe Thr
965 970 975

Ala Ser Leu Asp Asp Trp Gln Arg Glu His Asp Ala Ile Met Ala Arg
980 985 990

Val Leu Asp Lys Pro Gln Thr Ala Asp Val Phe Gln Asn Lys Val Asn
995 1000 1005

Val Cys Trp Ala Lys Ala Leu Glu Pro Val Leu Ala Thr Ala Asn
1010 1015 1020

Ile Val Leu Thr Arg Gln Gln Trp Glu Thr Leu His Pro Phe Lys
1025 1030 1035

His Asp Arg Ala Tyr Ser Pro Glu Met Ala Leu Asn Phe Phe Cys
1040 1045 1050

Thr Arg Phe Phe Gly Val Asp Leu Asp Ser Gly Leu Phe Ser Ala
1055 1060 1065

Pro Thr Val Ala Leu Thr Tyr Arg Asp Gln His Trp Asp Asn Ser
1070 1075 1080

Pro Gly Lys Asn Met Tyr Gly Leu Asn Arg Glu Val Ala Lys Glu
1085 1090 1095

Leu Ser Arg Arg Tyr Pro Cys Ile Thr Lys Ala Val Asp Thr Gly
1100 1105 1110

Arg Val Ala Asp Ile Arg Asn Asn Thr Ile Lys Asp Tyr Ser Pro
1115 1120 1125

Thr Ile Asn Val Val Pro Leu Asn Arg Arg Leu Pro His Ser Leu
1130 1135 1140

Ile Val Asp His Lys Gly Gln Gly Thr Thr Asp His Ser Gly Phe
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NEL-0001 Sequence Listing.txt

1145													
Leu	Ser	Lys	Met	Lys	Gly	Lys	Ser	Val	Leu	Val	Ile	Gly	Asp
1160						1165					1170		Pro
Ile	Ser	Ile	Pro	Gly	Lys	Lys	Val	Glu	Ser	Met	Gly	Pro	Leu
1175						1180					1185		Pro
Thr	Asn	Thr	Ile	Arg	Cys	Asp	Leu	Asp	Leu	Gly	Ile	Pro	Ser
1190						1195					1200		His
Val	Gly	Lys	Tyr	Asp	Ile	Ile	Phe	Val	Asn	Val	Arg	Thr	Pro
1205						1210					1215		Tyr
Arg	Asn	His	His	Tyr	Gln	Gln	Cys	Glu	Asp	His	Ala	Ile	His
1220						1225					1230		His
Ser	Met	Leu	Thr	Cys	Lys	Ala	Val	His	His	Leu	Asn	Thr	Gly
1235						1240					1245		Gly
Thr	Cys	Val	Ala	Ile	Gly	Tyr	Gly	Leu	Ala	Asp	Arg	Ala	Thr
1250						1255					1260		Glu
Asn	Ile	Ile	Thr	Ala	Val	Ala	Arg	Ser	Phe	Arg	Phe	Thr	Arg
1265						1270					1275		Val
Cys	Gln	Pro	Lys	Asn	Thr	Ala	Glu	Asn	Thr	Glu	Val	Leu	Phe
1280						1285					1290		Val
Phe	Phe	Gly	Lys	Asp	Asn	Gly	Asn	His	Thr	His	Asp	Gln	Asp
1295						1300					1305		Arg
Leu	Gly	Val	Val	Leu	Asp	Asn	Ile	Tyr	Gln	Gly	Ser	Thr	Arg
1310						1315					1320		Tyr
Glu	Ala	Gly	Arg	Ala	Pro	Ala	Tyr	Arg	Val	Ile	Arg	Gly	Asp
1325						1330					1335		Ile
Ser	Lys	Ser	Ala	Asp	Gln	Ala	Ile	Val	Asn	Ala	Ala	Asn	Ser
1340						1345					1350		Lys
Gly	Gln	Pro	Gly	Ser	Gly	Val	Cys	Gly	Ala	Leu	Tyr	Arg	Lys
1355						1360					1365		Trp
Pro	Ala	Ala	Phe	Asp	Arg	Gln	Pro	Ile	Ala	Val	Gly	Thr	Ala
1370						1375					1380		Arg

NEL-0001 Sequence Listing.txt

Leu	Val	Lys	His	Glu	Pro	Leu	Ile	Ile	His	Ala	Val	Gly	Pro	Asn
1385						1390					1395			
Phe	Ser	Lys	Met	Pro	Glu	Pro	Glu	Gly	Asp	Leu	Lys	Leu	Ala	Ala
1400						1405					1410			
Ala	Tyr	Met	Ser	Ile	Ala	Ser	Ile	Val	Asn	Ala	Glu	Arg	Ile	Thr
1415						1420					1425			
Lys	Ile	Ser	Val	Pro	Leu	Leu	Ser	Thr	Gly	Ile	Tyr	Ser	Gly	Gly
1430						1435					1440			
Lys	Asp	Arg	Val	Met	Gln	Ser	Leu	His	His	Leu	Phe	Thr	Ala	Phe
1445						1450					1455			
Asp	Thr	Thr	Asp	Ala	Asp	Val	Thr	Ile	Tyr	Cys	Leu	Asp	Lys	Gln
1460						1465					1470			
Trp	Glu	Thr	Arg	Ile	Ile	Glu	Ala	Ile	His	Arg	Lys	Glu	Ser	Val
1475						1480					1485			
Glu	Ile	Leu	Asp	Asp	Asp	Lys	Pro	Val	Asp	Ile	Asp	Leu	Val	Arg
1490						1495					1500			
Val	His	Pro	Asn	Ser	Ser	Leu	Ala	Gly	Arg	Pro	Gly	Tyr	Ser	Val
1505						1510					1515			
Asn	Glu	Gly	Lys	Leu	Tyr	Ser	Tyr	Leu	Glu	Gly	Thr	Arg	Phe	His
1520						1525					1530			
Gln	Thr	Ala	Lys	Asp	Ile	Ala	Glu	Ile	His	Ala	Met	Trp	Pro	Asn
1535						1540					1545			
Lys	Ser	Glu	Ala	Asn	Glu	Gln	Ile	Cys	Leu	Tyr	Ile	Leu	Gly	Glu
1550						1555					1560			
Ser	Met	Ser	Ser	Ile	Arg	Ser	Lys	Cys	Pro	Val	Glu	Glu	Ser	Glu
1565						1570					1575			
Ala	Ser	Ala	Pro	Pro	His	Thr	Leu	Pro	Cys	Leu	Cys	Asn	Tyr	Ala
1580						1585					1590			
Met	Thr	Ala	Glu	Arg	Val	Tyr	Arg	Leu	Arg	Ser	Ala	Lys	Lys	Glu
1595						1600					1605			
Gln	Phe	Ala	Val	Cys	Ser	Ser	Phe	Leu	Leu	Pro	Lys	Tyr	Arg	Ile
1610						1615					1620			

NEL-0001 Sequence Listing.txt

Thr	Gly	Val	Gln	Lys	Leu	Gln	Cys	Ser	Lys	Pro	Val	Leu	Phe	Ser
	1625					1630					1635			
Gly	Val	Val	Pro	Pro	Ala	Val	His	Pro	Arg	Lys	Tyr	Ala	Glu	Ile
	1640					1645					1650			
Ile	Leu	Glu	Thr	Pro	Pro	Pro	Pro	Ala	Thr	Thr	Thr	Val	Ile	Cys
	1655					1660					1665			
Glu	Pro	Thr	Val	Pro	Glu	Arg	Ile	Pro	Ser	Pro	Val	Ile	Ser	Arg
	1670					1675					1680			
Ala	Pro	Ser	Ala	Glu	Ser	Leu	Leu	Ser	Leu	Gly	Gly	Val	Ser	Phe
	1685					1690					1695			
Ser	Ser	Ser	Ala	Thr	Arg	Ser	Ser	Thr	Ala	Trp	Ser	Asp	Tyr	Asp
	1700					1705					1710			
Arg	Arg	Phe	Val	Val	Thr	Ala	Asp	Val	His	Gln	Ala	Asn	Thr	Ser
	1715					1720					1725			
Thr	Trp	Ser	Ile	Pro	Ser	Ala	Pro	Gly	Leu	Asp	Val	Gln	Leu	Pro
	1730					1735					1740			
Ser	Asp	Val	Thr	Asp	Ser	His	Trp	Ser	Ile	Pro	Ser	Ala	Ser	Gly
	1745					1750					1755			
Phe	Glu	Val	Arg	Thr	Pro	Ser	Val	Gln	Asp	Leu	Thr	Ala	Glu	Cys
	1760					1765					1770			
Ala	Lys	Pro	Arg	Gly	Leu	Ala	Glu	Ile	Met	Gln	Asp	Phe	Asn	Thr
	1775					1780					1785			
Ala	Pro	Phe	Gln	Phe	Leu	Ser	Asp	Tyr	Arg	Pro	Val	Pro	Ala	Pro
	1790					1795					1800			
Arg	Arg	Arg	Pro	Ile	Pro	Ser	Pro	Arg	Ser	Thr	Ala	Ser	Ala	Pro
	1805					1810					1815			
Pro	Val	Pro	Lys	Pro	Arg	Arg	Thr	Lys	Tyr	Gln	Gln	Pro	Pro	Gly
	1820					1825					1830			
Val	Ala	Arg	Ala	Ile	Ser	Glu	Ala	Glu	Leu	Asp	Glu	Tyr	Ile	Arg
	1835					1840					1845			
Gln	His	Ser	Asn											
	1850													

NEL-0001 Sequence Listing.txt

<210> 3
 <211> 614
 <212> PRT
 <213> western equine encephalomyelitis virus - strain 71V-1658

<400> 3

Arg Tyr Glu Ala Gly Ala Tyr Ile Phe Ser Ser Glu Thr Gly Gln Gly
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His Leu Gln Gln Lys Ser Val Arg Gln Cys Lys Leu Gln Glu Pro Ile
 20 25 30

Leu Asp Arg Ala Val His Glu Lys Tyr Tyr Ala Pro Arg Leu Asp Leu
 35 40 45

Glu Arg Glu Lys Met Leu Gln Lys Lys Leu Gln Leu Cys Ala Ser Glu
 50 55 60

Gly Asn Arg Ser Arg Tyr Gln Ser Arg Lys Val Glu Asn Met Lys Ala
 65 70 75 80

Ile Thr Ala Glu Arg Leu Ile Ser Gly Leu Gly Thr Tyr Leu Ser Ser
 85 90 95

Glu Val Asn Pro Val Glu Cys Tyr Arg Val Asn Tyr Pro Val Pro Ile
 100 105 110

Tyr Ser Ser Thr Val Ile Asn Arg Phe Thr Ser Ala Glu Val Ala Val
 115 120 125

Lys Thr Cys Asn Leu Val Ile Gln Glu Asn Tyr Pro Thr Val Ala Ser
 130 135 140

Tyr Cys Ile Thr Asp Glu Tyr Asp Ala Tyr Leu Asp Met Val Asp Gly
 145 150 155 160

Ala Ser Cys Cys Leu Asp Thr Ala Thr Phe Cys Pro Ala Lys Leu Arg
 165 170 175

Ser Tyr Pro Lys Lys His Ser Tyr Leu Gln Pro Glu Ile Arg Ser Ala
 180 185 190

Val Pro Ser Pro Ile Gln Asn Thr Leu Gln Asn Val Leu Ala Ala Ala
 195 200 205

Thr Lys Arg Asn Cys Asn Val Thr Gln Met Arg Glu Leu Pro Val Leu
 210 215 220

NEL-0001 Sequence Listing.txt

Asp Ser Ala Ala Phe Asn Val Asp Cys Phe Lys Lys Tyr Ala Cys Asn
 225 230 235 240
 Asp Glu Tyr Trp Asp Thr Phe Arg Asp Asn Pro Ile Arg Leu Thr Thr
 245 250 255
 Glu Asn Val Thr Gln Tyr Val Thr Lys Leu Lys Gly Pro Lys Ala Ala
 260 265 270
 Ala Leu Phe Ala Asn Thr His Asn Leu Lys Pro Leu Gln Glu Ile Pro
 275 280 285
 Met Asp Gln Phe Val Met Asp Leu Lys Arg Asp Val Lys Val Thr Pro
 290 295 300
 Gly Thr Lys His Thr Glu Glu Arg Pro Lys Val Gln Val Ile Gln Ala
 305 310 315 320
 Ala Asp Pro Leu Ala Thr Ala Tyr Leu Cys Gly Ile His Arg Glu Leu
 325 330 335
 Val Arg Arg Leu Asn Ala Val Leu Leu Pro Asn Ile His Thr Leu Phe
 340 345 350
 Asp Met Ser Ala Glu Asp Phe Asp Ala Ile Ile Ala Glu His Phe His
 355 360 365
 His Gly Asp Pro Val Leu Glu Thr Asp Ile Ala Ser Phe Asp Lys Ser
 370 375 380
 Glu Asp Asp Ala Ile Ala Ile Ser Ala Leu Met Ile Leu Glu Asp Leu
 385 390 395 400
 Gly Val Asp Gln Pro Leu Leu Asp Leu Ile Glu Ala Ala Phe Gly Asn
 405 410 415
 Ile Thr Ser Val His Leu Pro Thr Gly Thr Arg Phe Lys Phe Gly Ala
 420 425 430
 Met Met Lys Ser Gly Met Phe Leu Thr Leu Phe Val Asn Thr Leu Val
 435 440 445
 Asn Ile Met Ile Ala Ser Arg Val Leu Arg Glu Arg Leu Thr Thr Ser
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 Ala Cys Ala Ala Ser Ile Gly Asp Asp Asn Ile Val His Gly Val Val

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<212> PRT
<213> western equine encephalomyelitis virus - strain 71V-1658
<400> 4
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Pro Met Ala Tyr Arg Asp Pro Asn Pro Pro Arg Arg Arg Trp Arg Pro
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Phe Arg Pro Pro Leu Ala Ala Gln Ile Glu Asp Leu Arg Arg Ser Ile
35 40 45

Val Asn Leu Thr Phe Lys Gln Arg Ser Pro Asn Pro Pro Pro Gly Pro
50 55 60Pro Pro Lys Lys Lys Lys Ser Ala Pro Lys Pro Lys Pro Thr Glu Pro
Page 27

65		70		75		80									
Lys	Lys	Lys	Lys	Gln	Gln	Ala	Lys	Arg	Thr	Lys	Arg	Lys	Pro	Lys	Pro
				85					90					95	
Gly	Lys	Arg	Gln	Arg	Met	Cys	Met	Lys	Leu	Glu	Ser	Asp	Lys	Thr	Phe
			100					105					110		
Pro	Ile	Met	Leu	Asn	Gly	Gln	Val	Asn	Gly	Tyr	Ala	Cys	Val	Val	Gly
		115					120					125			
Gly	Arg	Leu	Met	Lys	Pro	Leu	His	Val	Glu	Gly	Lys	Ile	Asp	Asn	Glu
	130					135					140				
Gln	Leu	Ala	Ala	Val	Lys	Leu	Lys	Lys	Ala	Ser	Met	Tyr	Asp	Leu	Glu
145					150					155					160
Tyr	Gly	Asp	Val	Pro	Gln	Asn	Met	Lys	Ser	Asp	Thr	Leu	Gln	Tyr	Thr
				165					170					175	
Ser	Asp	Lys	Pro	Pro	Gly	Phe	Tyr	Asn	Trp	His	His	Gly	Ala	Val	Gln
			180					185					190		
Tyr	Glu	Asn	Gly	Arg	Phe	Thr	Val	Pro	Arg	Gly	Val	Gly	Gly	Lys	Gly
		195					200					205			
Asp	Ser	Gly	Arg	Pro	Ile	Leu	Asp	Asn	Arg	Gly	Arg	Val	Val	Ala	Ile
	210					215					220				
Val	Leu	Gly	Gly	Ala	Asn	Glu	Gly	Thr	Arg	Thr	Ala	Leu	Ser	Val	Val
225					230					235					240
Thr	Trp	Asn	Gln	Lys	Gly	Val	Thr	Ile	Arg	Asp	Thr	Pro	Glu	Gly	Ser
				245					250					255	
Glu	Pro	Trp	Ser	Leu	Val	Thr	Ala	Leu	Cys	Val	Leu	Ser	Asn	Val	Thr
			260					265					270		
Phe	Pro	Cys	Asp	Lys	Pro	Pro	Val	Cys	Tyr	Ser	Leu	Thr	Pro	Glu	Arg
		275					280					285			
Thr	Leu	Asp	Val	Leu	Glu	Glu	Asn	Val	Asp	Asn	Pro	Asn	Tyr	Asp	Thr
	290					295					300				
Leu	Leu	Glu	Asn	Val	Leu	Lys	Cys	Pro	Ser	Arg	Arg	Pro	Lys	Arg	Ser
305					310					315					320

NEL-0001 Sequence Listing.txt

Ile Thr Asp Asp Phe Thr Leu Thr Ser Pro Tyr Leu Gly Phe Cys Pro
325 330 335

Tyr Cys Arg His Ser Thr Pro Cys Phe Ser Pro Ile Lys Ile Glu Asn
340 345 350

Val Trp Asp Glu Ser Asp Asp Gly Ser Ile Arg Ile Gln Val Ser Ala
355 360 365

Gln Phe Gly Tyr Asn Gln Ala Gly Thr Ala Asp Val Thr Lys Phe Arg
370 375 380

Tyr Met Ser Phe Asp His Asp His Asp Ile Lys Glu Asp Ser Met Glu
385 390 395 400

Lys Ile Ala Ile Ser Thr Ser Gly Pro Cys Arg Arg Leu Gly His Lys
405 410 415

Gly Tyr Phe Leu Leu Ala Gln Cys Pro Pro Gly Asp Ser Val Thr Val
420 425 430

Ser Ile Thr Ser Gly Ala Ser Glu Asn Ser Cys Thr Val Glu Lys Lys
435 440 445

Ile Arg Arg Lys Phe Val Gly Arg Glu Glu Tyr Leu Phe Pro Pro Val
450 455 460

His Gly Lys Leu Val Lys Cys His Val Tyr Asp His Leu Lys Glu Thr
465 470 475 480

Ser Ala Gly Tyr Ile Thr Met His Arg Pro Gly Pro His Ala Tyr Lys
485 490 495

Ser Tyr Leu Glu Glu Ala Ser Gly Glu Val Tyr Ile Lys Pro Pro Ser
500 505 510

Gly Lys Asn Val Thr Tyr Glu Cys Lys Cys Gly Asp Tyr Ser Thr Gly
515 520 525

Ile Val Ser Thr Arg Thr Lys Met Asn Gly Cys Thr Lys Ala Lys Gln
530 535 540

Cys Ile Ala Tyr Lys Ser Asp Gln Thr Lys Trp Val Phe Asn Ser Pro
545 550 555 560

Asp Leu Ile Arg His Thr Asp His Ser Val Gln Gly Lys Leu His Ile
565 570 575

NEL-0001 Sequence Listing.txt

Pro Phe Arg Leu Thr Pro Thr Val Cys Pro Val Pro Leu Ala His Thr
580 585 590

Pro Thr Val Thr Lys Trp Phe Lys Gly Ile Thr Leu His Leu Thr Ala
595 600 605

Met Arg Pro Thr Leu Leu Thr Thr Arg Lys Leu Gly Leu Arg Ala Asp
610 615 620

Ala Thr Ala Glu Trp Ile Thr Gly Ser Thr Ser Arg Asn Phe Ser Val
625 630 635 640

Gly Arg Glu Gly Leu Glu Tyr Val Trp Gly Asn His Glu Pro Val Arg
645 650 655

Val Trp Ala Gln Glu Ser Ala Pro Gly Asp Pro His Gly Trp Pro His
660 665 670

Glu Ile Ile Ile His Tyr Tyr His Arg His Pro Val Tyr Thr Val Ile
675 680 685

Val Leu Cys Gly Val Ala Leu Ala Ile Leu Val Gly Thr Ala Ser Ser
690 695 700

Ala Ala Cys Ile Ala Lys Ala Arg Arg Asp Cys Leu Thr Pro Tyr Ala
705 710 715 720

Leu Ala Pro Asn Ala Thr Val Pro Thr Ala Leu Ala Val Leu Cys Cys
725 730 735

Ile Arg Pro Thr Asn Ala Glu Thr Phe Gly Glu Thr Leu Asn His Leu
740 745 750

Trp Phe Asn Asn Gln Pro Phe Leu Trp Ala Gln Leu Cys Ile Pro Leu
755 760 765

Ala Ala Leu Val Ile Leu Phe Arg Cys Phe Ser Cys Cys Met Pro Phe
770 775 780

Leu Leu Val Ala Gly Val Cys Leu Gly Lys Val Asp Ala Phe Glu His
785 790 795 800

Ala Thr Thr Val Pro Asn Val Pro Gly Ile Pro Tyr Lys Ala Leu Val
805 810 815

Glu Arg Ala Gly Tyr Ala Pro Leu Asn Leu Glu Ile Thr Val Val Ser
820 825 830

NEL-0001 Sequence Listing.txt

Ser Glu Leu Thr Pro Ser Thr Asn Lys Glu Tyr Val Thr Cys Lys Phe
835 840 845

His Thr Val Ile Pro Ser Pro Gln Val Lys Cys Cys Gly Ser Leu Glu
850 855 860

Cys Lys Ala Ser Ser Lys Ala Asp Tyr Thr Cys Arg Val Phe Gly Gly
865 870 875 880

Val Tyr Pro Phe Met Trp Gly Gly Ala Gln Cys Phe Cys Asp Ser Glu
885 890 895

Asn Thr Gln Leu Ser Glu Ala Tyr Val Glu Phe Ala Pro Asp Cys Thr
900 905 910

Ile Asp His Ala Val Ala Leu Lys Val His Thr Ala Ala Leu Lys Val
915 920 925

Gly Leu Arg Ile Val Tyr Gly Asn Thr Thr Ala His Leu Asp Thr Phe
930 935 940

Val Asn Gly Val Thr Pro Gly Ser Ser Arg Asp Leu Lys Val Ile Ala
945 950 955 960

Gly Pro Ile Ser Ala Ala Phe Ser Pro Phe Asp His Lys Val Val Ile
965 970 975

Arg Lys Gly Leu Val Tyr Asn Tyr Asp Phe Pro Glu Tyr Gly Ala Met
980 985 990

Lys Pro Gly Ala Phe Gly Asp Ile Gln Ala Ser Ser Leu Asp Ala Thr
995 1000 1005

Asp Ile Val Ala Arg Thr Asp Ile Arg Leu Leu Lys Pro Ser Val
1010 1015 1020

Lys Asn Ile His Val Pro Tyr Thr Gln Ala Val Ser Gly Tyr Glu
1025 1030 1035

Met Trp Lys Asn Asn Ser Gly Arg Pro Leu Gln Glu Thr Ala Pro
1040 1045 1050

Phe Gly Cys Lys Ile Glu Val Glu Pro Leu Arg Ala Ser Asn Cys
1055 1060 1065

Ala Tyr Gly His Ile Pro Ile Ser Ile Asp Ile Pro Asp Ala Ala

1070

Phe Val Arg Ser Ser Glu Ser Pro Thr Ile Leu Glu Val Ser Cys
1085 1090 1095

Thr Val Ala Asp Cys Ile Tyr Ser Ala Asp Phe Gly Gly Ser Leu
1100 1105 1110

Thr Leu Gln Tyr Lys Ala Asp Arg Glu Gly His Cys Pro Val His
1115 1120 1125

Ser His Ser Thr Thr Ala Val Leu Lys Glu Ala Thr Thr His Val
1130 1135 1140

Thr Ala Val Gly Ser Ile Thr Leu His Phe Ser Thr Ser Ser Pro
1145 1150 1155

Gln Ala Asn Phe Ile Val Ser Leu Cys Gly Lys Lys Ser Thr Cys
1160 1165 1170

Asn Ala Glu Cys Lys Pro Pro Ala Asp His Ile Ile Gly Glu Pro
1175 1180 1185

His Lys Val Asp Gln Glu Phe Gln Ala Ala Val Ser Lys Thr Ser
1190 1195 1200

Trp Asn Trp Leu Leu Ala Leu Phe Gly Gly Ala Ser Ser Leu Ile
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Val Val Gly Leu Ile Val Leu Val Cys Ser Ser Met Leu Ile Asn
1220 1225 1230

Thr Arg Arg
1235

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<212> DNA
<213> Western equine encephalomyelitis virus - strain 71V-1658

<220>
<221> CDS
<222> (159)..(3869)
<223> vector sequence 1-9; 5' SacI primer 9-20; 3' end of NS4 gene 16-14; intragenic region 115-158; polyprotein (C-E3-E2-6K-E1) 159-3856; pcDW-XH7 nontranslated region 3857-4150

<400> 5
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NEL-0001 Sequence Listing.txt

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taggtgacgt agtagacacg cacctaccca ccggcaga atg ttt cca tac cct cag	176
Met Phe Pro Tyr Pro Gln	
1 5	
ctg aac ttt cca cca gtt tac cct aca aat ccg atg gct tac cga gat	224
Leu Asn Phe Pro Pro Val Tyr Pro Thr Asn Pro Met Ala Tyr Arg Asp	
10 15 20	
cca aac cct cct agg cgc cgc tgg agg ccg ttt cgg ccc ccg ctg gct	272
Pro Asn Pro Pro Arg Arg Arg Trp Arg Pro Phe Arg Pro Pro Leu Ala	
25 30 35	
gct caa atc gaa gat ctt agg agg tcg ata gtc aac ttg act ttc aaa	320
Ala Gln Ile Glu Asp Leu Arg Arg Ser Ile Val Asn Leu Thr Phe Lys	
40 45 50	
caa cga tca cct aat ccg ccg cca ggt cca ccg cca aag aag aag aag	368
Gln Arg Ser Pro Asn Pro Pro Pro Gly Pro Pro Pro Lys Lys Lys Lys	
55 60 65 70	
agt gct cct aag cca aaa cct act cag cct aaa aag aag aag cag caa	416
Ser Ala Pro Lys Pro Lys Pro Thr Gln Pro Lys Lys Lys Lys Gln Gln	
75 80 85	
gcc aag agg acg aaa cgc aag cct aaa cca ggg aaa cga caa cgt atg	464
Ala Lys Arg Thr Lys Arg Lys Pro Lys Pro Gly Lys Arg Gln Arg Met	
90 95 100	
tgt atg aag ttg gag tcg gac aag aca ttt ccg atc atg ctg aac ggc	512
Cys Met Lys Leu Glu Ser Asp Lys Thr Phe Pro Ile Met Leu Asn Gly	
105 110 115	
caa gtg aat gga tat gcc tgc gtt gtc gga gga agg ctg atg aaa cca	560
Gln Val Asn Gly Tyr Ala Cys Val Val Gly Gly Arg Leu Met Lys Pro	
120 125 130	
ctc cac gtt gaa gga aaa att gat aat gag caa tta gcg gcc gtg aaa	608
Leu His Val Glu Gly Lys Ile Asp Asn Glu Gln Leu Ala Ala Val Lys	
135 140 145 150	
ttg aag aag gct agc atg tac gac ttg gag tac ggc gac gtt ccc cag	656
Leu Lys Lys Ala Ser Met Tyr Asp Leu Glu Tyr Gly Asp Val Pro Gln	
155 160 165	
aac atg aaa tca gac acg ctg cag tac acc agc gac aaa cca ccg ggc	704
Asn Met Lys Ser Asp Thr Leu Gln Tyr Thr Ser Asp Lys Pro Pro Gly	
170 175 180	
ttc tac aac tgg cac cac ggc gca gtc cag tat gag aat ggg aga ttt	752
Phe Tyr Asn Trp His His Gly Ala Val Gln Tyr Glu Asn Gly Arg Phe	
185 190 195	
acc gta ccg aga gga gtg ggc ggg aaa ggc gac agc gga aga ccg atc	800
Thr Val Pro Arg Gly Val Gly Gly Lys Gly Asp Ser Gly Arg Pro Ile	
200 205 210	
ctg gac aac aga ggc aga gtt gtg gct att gtt cta gga ggt gca aat	848
Leu Asp Asn Arg Gly Arg Val Val Ala Ile Val Leu Gly Gly Ala Asn	
215 220 225 230	
gag ggc acg cgt acg gcg ctt tca gtg gtc act tgg aac cag aaa ggg	896

NEL-0001 Sequence Listing.txt

Glu	Gly	Thr	Arg	Thr 235	Ala	Leu	Ser	Val	Val 240	Thr	Trp	Asn	Gln	Lys 245	Gly	
gtg	acc	att	agg	gat	acc	ccc	gaa	ggt	tct	gaa	ccg	tgg	tca	cta	gtt	944
Val	Thr	Ile	Arg 250	Asp	Thr	Pro	Glu	Gly 255	Ser	Glu	Pro	Trp	Ser 260	Leu	Val	
aca	gcg	cta	tgc	gtg	ctt	tcg	aat	gtc	acg	ttc	cca	tgc	gac	aaa	cca	992
Thr	Ala	Leu 265	Cys	Val	Leu	Ser	Asn 270	Val	Thr	Phe	Pro	Cys 275	Asp	Lys	Pro	
ccc	gtg	tgc	tat	tca	ctg	acg	cca	gaa	cga	aca	ctc	gac	gtg	ctc	gaa	1040
Pro	Val 280	Cys	Tyr	Ser	Leu	Thr 285	Pro	Glu	Arg	Thr	Leu 290	Asp	Val	Leu	Glu	
gag	aac	gtc	gac	aat	cca	aat	tac	gac	acg	ctg	ctg	gag	aac	gtc	ttg	1088
Glu 295	Asn	Val	Asp	Asn	Pro 300	Asn	Tyr	Asp	Thr	Leu 305	Leu	Glu	Asn	Val	Leu 310	
aaa	tgt	cca	tca	cgc	cgg	ccc	aaa	cga	agc	att	acc	gat	gac	ttc	aca	1136
Lys	Cys	Pro	Ser	Arg 315	Arg	Pro	Lys	Arg	Ser 320	Ile	Thr	Asp	Asp	Phe 325	Thr	
ctg	acc	agt	ccc	tac	ctg	ggg	ttc	tgc	ccg	tat	tgc	aga	cac	tca	acg	1184
Leu	Thr	Ser	Pro 330	Tyr	Leu	Gly	Phe	Cys 335	Pro	Tyr	Cys	Arg	His 340	Ser	Thr	
ccg	tgt	ttc	agc	cca	ata	aaa	att	gag	aac	gtg	tgg	gac	gaa	tct	gat	1232
Pro	Cys	Phe 345	Ser	Pro	Ile	Lys	Ile 350	Glu	Asn	Val	Trp	Asp 355	Glu	Ser	Asp	
gat	gga	tcg	att	aga	atc	cag	gtc	tcg	gca	caa	ttc	ggc	tac	aat	cag	1280
Asp	Gly 360	Ser	Ile	Arg	Ile	Gln 365	Val	Ser	Ala	Gln	Phe 370	Gly	Tyr	Asn	Gln	
gca	ggc	act	gcg	gat	gtc	acc	aaa	ttc	cgt	tac	atg	tct	ttc	gac	cac	1328
Ala 375	Gly	Thr	Ala	Asp	Val 380	Thr	Lys	Phe	Arg	Tyr 385	Met	Ser	Phe	Asp	His 390	
gac	cat	gac	atc	aag	gaa	gac	agt	atg	gag	aaa	ata	gct	atc	agc	aca	1376
Asp	His	Asp	Ile	Lys 395	Glu	Asp	Ser	Met	Glu 400	Lys	Ile	Ala	Ile	Ser 405	Thr	
tct	gga	ccc	tgc	cgt	cgt	ctt	ggc	cac	aaa	ggg	tac	ttc	ctg	tta	gct	1424
Ser	Gly	Pro	Cys 410	Arg	Arg	Leu	Gly	His 415	Lys	Gly	Tyr	Phe	Leu 420	Leu	Ala	
caa	tgt	cct	cca	ggt	gac	agt	gta	acc	gtc	agt	atc	acg	agc	gga	gca	1472
Gln	Cys	Pro 425	Pro	Gly	Asp	Ser	Val 430	Thr	Val	Ser	Ile	Thr 435	Ser	Gly	Ala	
tct	gag	aat	tca	tgc	acc	gtg	gag	aaa	aag	atc	agg	agg	aag	ttt	gtc	1520
Ser	Glu 440	Asn	Ser	Cys	Thr	Val 445	Glu	Lys	Lys	Ile	Arg 450	Arg	Lys	Phe	Val	
ggt	aga	gag	gag	tac	ttg	ttc	cca	ccc	gtc	cat	gga	aag	ctg	gta	aag	1568
Gly 455	Arg	Glu	Glu	Tyr	Leu 460	Phe	Pro	Pro	Val	His 465	Gly	Lys	Leu	Val	Lys 470	
tgc	cac	gtt	tac	gat	cac	ttg	aag	gag	acg	tct	gcc	ggg	tac	ata	acc	1616
Cys	His	Val	Tyr	Asp 475	His	Leu	Lys	Glu	Thr 480	Ser	Ala	Gly	Tyr	Ile 485	Thr	

NEL-0001 Sequence Listing.txt

atg cac agg cca ggc cca cac gcg tat aag tcc tat ctg gag gaa gcg Met His Arg Pro Gly Pro His Ala Tyr Lys Ser Tyr Leu Glu Glu Ala 490 495 500	1664
tca ggc gaa gtg tac att aaa cca cct tct ggc aag aac gtc acc tac Ser Gly Glu Val Tyr Ile Lys Pro Pro Ser Gly Lys Asn Val Thr Tyr 505 510 515	1712
gaa tgt aag tgt ggc gac tac agc aca ggt atc gtg agc acg cga acg Glu Cys Lys Cys Gly Asp Tyr Ser Thr Gly Ile Val Ser Thr Arg Thr 520 525 530	1760
aag atg aac ggc tgc act aaa gca aaa cag tgc att gcc tac aag agc Lys Met Asn Gly Cys Thr Lys Ala Lys Gln Cys Ile Ala Tyr Lys Ser 535 540 545 550	1808
gac caa acg aaa tgg gtc ttc aac tcg ccg gat ctt att agg cac aca Asp Gln Thr Lys Trp Val Phe Asn Ser Pro Asp Leu Ile Arg His Thr 555 560 565	1856
gac cac tca gtg caa ggt aaa ttg cac att cca ttc cgc ttg aca ccg Asp His Ser Val Gln Gly Lys Leu His Ile Pro Phe Arg Leu Thr Pro 570 575 580	1904
aca gtc tgc ccg gtt ccg tta gct cac acg cct aca gtc acg aag tgg Thr Val Cys Pro Val Pro Leu Ala His Thr Pro Thr Val Thr Lys Trp 585 590 595	1952
ttc aaa ggc atc acc ctc cac ctg act gca atg cga cca aca ttg ctg Phe Lys Gly Ile Thr Leu His Leu Thr Ala Met Arg Pro Thr Leu Leu 600 605 610	2000
aca acg aga aaa ttg ggg ctg cga gca gac gca aca gca gaa tgg att Thr Thr Arg Lys Leu Gly Leu Arg Ala Asp Ala Thr Ala Glu Trp Ile 615 620 625 630	2048
aca ggg tct aca tcc agg aat ttt tct gtg ggg cga gaa ggg ctg gag Thr Gly Ser Thr Ser Arg Asn Phe Ser Val Gly Arg Glu Gly Leu Glu 635 640 645	2096
tac gta tgg ggt aac cat gaa cca gtc aga gtc tgg gcc cag gag tcg Tyr Val Trp Gly Asn His Glu Pro Val Arg Val Trp Ala Gln Glu Ser 650 655 660	2144
gca cca ggc gac cca cat gga tgg ccg cat gag atc atc atc cac tat Ala Pro Gly Asp Pro His Gly Trp Pro His Glu Ile Ile Ile His Tyr 665 670 675	2192
tat cat cgg cat cca gtc tac act gtc att gtg ctg tgt ggt gtc gct Tyr His Arg His Pro Val Tyr Thr Val Ile Val Leu Cys Gly Val Ala 680 685 690	2240
ctt gct atc ctg gta ggc act gca tca tca gca gct tgc atc gcc aaa Leu Ala Ile Leu Val Gly Thr Ala Ser Ser Ala Ala Cys Ile Ala Lys 695 700 705 710	2288
gca aga aga gac tgc ctg acg cca tac gcg ctt gca ccg aac gca acg Ala Arg Arg Asp Cys Leu Thr Pro Tyr Ala Leu Ala Pro Asn Ala Thr 715 720 725	2336
gta ccc aca gca tta gcg gtt ttg tgc tgc att cgg cca acc aac gct Val Pro Thr Ala Leu Ala Val Leu Cys Cys Ile Arg Pro Thr Asn Ala 730 735 740	2384

NEL-0001 Sequence Listing.txt

gaa aca ttt gga gaa act ttg aac cat ctg tgg ttt aac aac caa ccg Glu Thr Phe Gly Glu Thr Leu Asn His Leu Trp Phe Asn Asn Gln Pro 745 750 755	2432
ttt ctc tgg gca cag ttg tgc att cct ctg gca gcg ctt gtt att ctg Phe Leu Trp Ala Gln Leu Cys Ile Pro Leu Ala Ala Leu Val Ile Leu 760 765 770	2480
ttc cgc tgc ttt tca tgc tgc atg cct ttt tta ttg gtt gca ggc gtc Phe Arg Cys Phe Ser Cys Cys Met Pro Phe Leu Leu Val Ala Gly Val 775 780 785 790	2528
tgc ctg ggg aag gta gac gcc ttc gaa cat gcg acc act gtg cca aat Cys Leu Gly Lys Val Asp Ala Phe Glu His Ala Thr Thr Val Pro Asn 795 800 805	2576
gtt ccg ggg atc ccg tat aag gcg ttg gtc gaa cgc gca ggt tac gcg Val Pro Gly Ile Pro Tyr Lys Ala Leu Val Glu Arg Ala Gly Tyr Ala 810 815 820	2624
cca ctt aac ctg gag atc acg gtc gtc tca tcg gaa tta aca cct tca Pro Leu Asn Leu Glu Ile Thr Val Val Ser Ser Glu Leu Thr Pro Ser 825 830 835	2672
act aac aag gag tac gtg acc tgc aaa ttc cac aca gtc att cct tca Thr Asn Lys Glu Tyr Val Thr Cys Lys Phe His Thr Val Ile Pro Ser 840 845 850	2720
cca caa gtt aaa tgc tgc ggg tcc ctc gag tgc aag gca tcc tca aag Pro Gln Val Lys Cys Cys Gly Ser Leu Glu Cys Lys Ala Ser Ser Lys 855 860 865 870	2768
gcg gat tac aca tgc cgc gtt ttt ggc ggt gtg tac cct ttc atg tgg Ala Asp Tyr Thr Cys Arg Val Phe Gly Gly Val Tyr Pro Phe Met Trp 875 880 885	2816
gga ggc gca caa tgc ttc tgt gac agt gag aac aca caa ctg agt gag Gly Gly Ala Gln Cys Phe Cys Asp Ser Glu Asn Thr Gln Leu Ser Glu 890 900	2864
gcg tac gtc gag ttc gct cca gac tgc act ata gat cac gca gtc gca Ala Tyr Val Glu Phe Ala Pro Asp Cys Thr Ile Asp His Ala Val Ala 905 910 915	2912
cta aaa gtt cac aca gct gct ctg aaa gtc ggc ctg cgt ata gta tac Leu Lys Val His Thr Ala Ala Leu Lys Val Gly Leu Arg Ile Val Tyr 920 925 930	2960
ggc aac acc acc gcg cac ctg gat acg ttt gtc aat ggc gtc acg cca Gly Asn Thr Thr Ala His Leu Asp Thr Phe Val Asn Gly Val Thr Pro 935 940 945 950	3008
ggt tcc tca cgg gac ctg aag gtc ata gca ggg ccg ata tca gcc gct Gly Ser Ser Arg Asp Leu Lys Val Ile Ala Gly Pro Ile Ser Ala Ala 955 960 965	3056
ttt tca ccc ttt gac cat aag gtc gtc atc aga aag ggg ctt gtt tac Phe Ser Pro Phe Asp His Lys Val Val Ile Arg Lys Gly Leu Val Tyr 970 975 980	3104
aac tac gac ttc cct gag tat gga gct atg aaa cca gga gcg ttc ggc Asn Tyr Asp Phe Pro Glu Tyr Gly Ala Met Lys Pro Gly Ala Phe Gly 985 990	3152

NEL-0001 Sequence Listing.txt

985						990						995						
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act	gac	ata	cgg	ctg	ctg	aag	cct	tct	gtc	aag	aac	atc	cac	gtc	3242			
Thr	Asp	Ile	Arg	Leu	Leu	Lys	Pro	Ser	Val	Lys	Asn	Ile	His	Val				
	1015					1020					1025							
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Pro	Tyr	Thr	Gln	Ala	Val	Ser	Gly	Tyr	Glu	Met	Trp	Lys	Asn	Asn				
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tca	gga	cga	ccc	ctg	caa	gaa	aca	gca	cca	ttt	gga	tgt	aaa	att	3332			
Ser	Gly	Arg	Pro	Leu	Gln	Glu	Thr	Ala	Pro	Phe	Gly	Cys	Lys	Ile				
	1045					1050					1055							
gaa	gtg	gag	cct	ctg	cga	gcg	tct	aac	tgt	gct	tac	ggg	cac	atc	3377			
Glu	Val	Glu	Pro	Leu	Arg	Ala	Ser	Asn	Cys	Ala	Tyr	Gly	His	Ile				
	1060					1065					1070							
cct	atc	tcg	att	gac	atc	cct	gat	gca	gct	ttt	gtg	aga	tca	tca	3422			
Pro	Ile	Ser	Ile	Asp	Ile	Pro	Asp	Ala	Ala	Phe	Val	Arg	Ser	Ser				
	1075					1080					1085							
gaa	tca	cca	aca	att	tta	gaa	gtt	agc	tgc	aca	gta	gca	gac	tgc	3467			
Glu	Ser	Pro	Thr	Ile	Leu	Glu	Val	Ser	Cys	Thr	Val	Ala	Asp	Cys				
	1090					1095					1100							
att	tat	tct	gca	gac	ttt	ggt	ggt	tct	cta	aca	tta	cag	tac	aaa	3512			
Ile	Tyr	Ser	Ala	Asp	Phe	Gly	Gly	Ser	Leu	Thr	Leu	Gln	Tyr	Lys				
	1105					1110					1115							
gct	gac	agg	gag	gga	cat	tgt	cca	gtt	cac	tcc	cac	tcc	acg	aca	3557			
Ala	Asp	Arg	Glu	Gly	His	Cys	Pro	Val	His	Ser	His	Ser	Thr	Thr				
	1120					1125					1130							
gct	gtt	ttg	aag	gaa	gcg	acc	aca	cat	gtg	act	gcc	gta	ggc	agc	3602			
Ala	Val	Leu	Lys	Glu	Ala	Thr	Thr	His	Val	Thr	Ala	Val	Gly	Ser				
	1135					1140					1145							
ata	aca	cta	cat	ttt	agc	aca	tcg	agc	cca	caa	gca	aat	ttt	ata	3647			
Ile	Thr	Leu	His	Phe	Ser	Thr	Ser	Ser	Pro	Gln	Ala	Asn	Phe	Ile				
	1150					1155					1160							
gtt	tcg	cta	tgc	ggc	aag	aag	tcc	acc	tgc	aat	gct	gaa	tgt	aaa	3692			
Val	Ser	Leu	Cys	Gly	Lys	Lys	Ser	Thr	Cys	Asn	Ala	Glu	Cys	Lys				
	1165					1170					1175							
cca	ccg	gcc	gac	cac	ata	att	gga	gaa	cca	cat	aaa	gtc	gac	caa	3737			
Pro	Pro	Ala	Asp	His	Ile	Ile	Gly	Glu	Pro	His	Lys	Val	Asp	Gln				
	1180					1185					1190							
gaa	ttc	cag	gcg	gca	gtt	tcc	aaa	aca	tct	tgg	aac	tgg	ctg	ctt	3782			
Glu	Phe	Gln	Ala	Ala	Val	Ser	Lys	Thr	Ser	Trp	Asn	Trp	Leu	Leu				
	1195					1200					1205							
gca	ctg	ttt	ggg	gga	gca	tca	tcc	ctc	att	gtt	gta	gga	ctt	ata	3827			
Ala	Leu	Phe	Gly	Gly	Ala	Ser	Ser	Leu	Ile	Val	Val	Gly	Leu	Ile				
	1210					1215					1220							
gtg	ttg	gtc	tgc	agc	tct	atg	ctt	ata	aac	aca	cgt	aga	tga		3869			

NEL-0001 Sequence Listing.txt

Val Leu Val Cys Ser Ser Met Leu Ile Asn Thr Arg Arg
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 taatgccacg cgccgcttga cactaaaact cgatgtatctt ccgaggaagc acagtgcata 3989
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 <211> 1236
 <212> PRT
 <213> Western equine encephalomyelitis virus - strain 71V-1658
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Met Phe Pro Tyr Pro Gln Leu Asn Phe Pro Pro Val Tyr Pro Thr Asn
 1 5 10 15

Pro Met Ala Tyr Arg Asp Pro Asn Pro Pro Arg Arg Arg Trp Arg Pro
 20 25 30

Phe Arg Pro Pro Leu Ala Ala Gln Ile Glu Asp Leu Arg Arg Ser Ile
 35 40 45

Val Asn Leu Thr Phe Lys Gln Arg Ser Pro Asn Pro Pro Pro Gly Pro
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Pro Pro Lys Lys Lys Lys Ser Ala Pro Lys Pro Lys Pro Thr Gln Pro
 65 70 75 80

Lys Lys Lys Lys Gln Gln Ala Lys Arg Thr Lys Arg Lys Pro Lys Pro
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Gly Lys Arg Gln Arg Met Cys Met Lys Leu Glu Ser Asp Lys Thr Phe
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Pro Ile Met Leu Asn Gly Gln Val Asn Gly Tyr Ala Cys Val Val Gly
 115 120 125

Gly Arg Leu Met Lys Pro Leu His Val Glu Gly Lys Ile Asp Asn Glu
 130 135 140

Gln Leu Ala Ala Val Lys Leu Lys Lys Ala Ser Met Tyr Asp Leu Glu
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Tyr Gly Asp Val Pro Gln Asn Met Lys Ser Asp Thr Leu Gln Tyr Thr
 165 170 175

NEL-0001 Sequence Listing.txt

Ser Asp Lys Pro Pro Gly Phe Tyr Asn Trp His His Gly Ala Val Gln
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Tyr Glu Asn Gly Arg Phe Thr Val Pro Arg Gly Val Gly Gly Lys Gly
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Asp Ser Gly Arg Pro Ile Leu Asp Asn Arg Gly Arg Val Val Ala Ile
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Val Leu Gly Gly Ala Asn Glu Gly Thr Arg Thr Ala Leu Ser Val Val
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Thr Trp Asn Gln Lys Gly Val Thr Ile Arg Asp Thr Pro Glu Gly Ser
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Glu Pro Trp Ser Leu Val Thr Ala Leu Cys Val Leu Ser Asn Val Thr
260 265 270

Phe Pro Cys Asp Lys Pro Pro Val Cys Tyr Ser Leu Thr Pro Glu Arg
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Thr Leu Asp Val Leu Glu Glu Asn Val Asp Asn Pro Asn Tyr Asp Thr
290 295 300

Leu Leu Glu Asn Val Leu Lys Cys Pro Ser Arg Arg Pro Lys Arg Ser
305 310 315 320

Ile Thr Asp Asp Phe Thr Leu Thr Ser Pro Tyr Leu Gly Phe Cys Pro
325 330 335

Tyr Cys Arg His Ser Thr Pro Cys Phe Ser Pro Ile Lys Ile Glu Asn
340 345 350

Val Trp Asp Glu Ser Asp Asp Gly Ser Ile Arg Ile Gln Val Ser Ala
355 360 365

Gln Phe Gly Tyr Asn Gln Ala Gly Thr Ala Asp Val Thr Lys Phe Arg
370 375 380

Tyr Met Ser Phe Asp His Asp His Asp Ile Lys Glu Asp Ser Met Glu
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Lys Ile Ala Ile Ser Thr Ser Gly Pro Cys Arg Arg Leu Gly His Lys
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Gly Tyr Phe Leu Leu Ala Gln Cys Pro Pro Gly Asp Ser Val Thr Val

NEL-0001 Sequence Listing.txt

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 His Gly Lys Leu Val Lys Cys His Val Tyr Asp His Leu Lys Glu Thr
 465 470 475 480
 Ser Ala Gly Tyr Ile Thr Met His Arg Pro Gly Pro His Ala Tyr Lys
 485 490 495
 Ser Tyr Leu Glu Glu Ala Ser Gly Glu Val Tyr Ile Lys Pro Pro Ser
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 Gly Lys Asn Val Thr Tyr Glu Cys Lys Cys Gly Asp Tyr Ser Thr Gly
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 Ile Val Ser Thr Arg Thr Lys Met Asn Gly Cys Thr Lys Ala Lys Gln
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 Pro Thr Val Thr Lys Trp Phe Lys Gly Ile Thr Leu His Leu Thr Ala
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 Met Arg Pro Thr Leu Leu Thr Thr Arg Lys Leu Gly Leu Arg Ala Asp
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 Ala Thr Ala Glu Trp Ile Thr Gly Ser Thr Ser Arg Asn Phe Ser Val
 625 630 635 640
 Gly Arg Glu Gly Leu Glu Tyr Val Trp Gly Asn His Glu Pro Val Arg
 645 650 655
 Val Trp Ala Gln Glu Ser Ala Pro Gly Asp Pro His Gly Trp Pro His
 660 665 670

NEL-0001 Sequence Listing.txt

Glu Ile Ile Ile His Tyr Tyr His Arg His Pro Val Tyr Thr Val Ile
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Val Leu Cys Gly Val Ala Leu Ala Ile Leu Val Gly Thr Ala Ser Ser
690 695 700

Ala Ala Cys Ile Ala Lys Ala Arg Arg Asp Cys Leu Thr Pro Tyr Ala
705 710 715 720

Leu Ala Pro Asn Ala Thr Val Pro Thr Ala Leu Ala Val Leu Cys Cys
725 730 735

Ile Arg Pro Thr Asn Ala Glu Thr Phe Gly Glu Thr Leu Asn His Leu
740 745 750

Trp Phe Asn Asn Gln Pro Phe Leu Trp Ala Gln Leu Cys Ile Pro Leu
755 760 765

Ala Ala Leu Val Ile Leu Phe Arg Cys Phe Ser Cys Cys Met Pro Phe
770 775 780

Leu Leu Val Ala Gly Val Cys Leu Gly Lys Val Asp Ala Phe Glu His
785 790 795 800

Ala Thr Thr Val Pro Asn Val Pro Gly Ile Pro Tyr Lys Ala Leu Val
805 810 815

Glu Arg Ala Gly Tyr Ala Pro Leu Asn Leu Glu Ile Thr Val Val Ser
820 825 830

Ser Glu Leu Thr Pro Ser Thr Asn Lys Glu Tyr Val Thr Cys Lys Phe
835 840 845

His Thr Val Ile Pro Ser Pro Gln Val Lys Cys Cys Gly Ser Leu Glu
850 855 860

Cys Lys Ala Ser Ser Lys Ala Asp Tyr Thr Cys Arg Val Phe Gly Gly
865 870 875 880

Val Tyr Pro Phe Met Trp Gly Gly Ala Gln Cys Phe Cys Asp Ser Glu
885 890 895

Asn Thr Gln Leu Ser Glu Ala Tyr Val Glu Phe Ala Pro Asp Cys Thr
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Ile Asp His Ala Val Ala Leu Lys Val His Thr Ala Ala Leu Lys Val
915 920 925

NEL-0001 Sequence Listing.txt

Gly Leu Arg Ile Val Tyr Gly Asn Thr Thr Ala His Leu Asp Thr Phe
930 935 940

Val Asn Gly Val Thr Pro Gly Ser Ser Arg Asp Leu Lys Val Ile Ala
945 950 955 960

Gly Pro Ile Ser Ala Ala Phe Ser Pro Phe Asp His Lys Val Val Ile
965 970 975

Arg Lys Gly Leu Val Tyr Asn Tyr Asp Phe Pro Glu Tyr Gly Ala Met
980 985 990

Lys Pro Gly Ala Phe Gly Asp Ile Gln Ala Ser Ser Leu Asp Ala Thr
995 1000 1005

Asp Ile Val Ala Arg Thr Asp Ile Arg Leu Leu Lys Pro Ser Val
1010 1015 1020

Lys Asn Ile His Val Pro Tyr Thr Gln Ala Val Ser Gly Tyr Glu
1025 1030 1035

Met Trp Lys Asn Asn Ser Gly Arg Pro Leu Gln Glu Thr Ala Pro
1040 1045 1050

Phe Gly Cys Lys Ile Glu Val Glu Pro Leu Arg Ala Ser Asn Cys
1055 1060 1065

Ala Tyr Gly His Ile Pro Ile Ser Ile Asp Ile Pro Asp Ala Ala
1070 1075 1080

Phe Val Arg Ser Ser Glu Ser Pro Thr Ile Leu Glu Val Ser Cys
1085 1090 1095

Thr Val Ala Asp Cys Ile Tyr Ser Ala Asp Phe Gly Gly Ser Leu
1100 1105 1110

Thr Leu Gln Tyr Lys Ala Asp Arg Glu Gly His Cys Pro Val His
1115 1120 1125

Ser His Ser Thr Thr Ala Val Leu Lys Glu Ala Thr Thr His Val
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Thr Ala Val Gly Ser Ile Thr Leu His Phe Ser Thr Ser Ser Pro
1145 1150 1155

Gln Ala Asn Phe Ile Val Ser Leu Cys Gly Lys Lys Ser Thr Cys
1160 1165 1170

NEL-0001 Sequence Listing.txt

Asn Ala Glu Cys Lys Pro Pro Ala Asp His Ile Ile Gly Glu Pro
1175 1180 1185

His Lys Val Asp Gln Glu Phe Gln Ala Ala Val Ser Lys Thr Ser
1190 1195 1200

Trp Asn Trp Leu Leu Ala Leu Phe Gly Gly Ala Ser Ser Leu Ile
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Val Val Gly Leu Ile Val Leu Val Cys Ser Ser Met Leu Ile Asn
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Thr Arg Arg
1235

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<220>
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<222> (1)..(1260)
<223> Pvac vector sequence: 1-196; CMV promoter: 1-115; CMV putative transcriptional start site: 125; T7 promoter: 48-167; pVAX multicloning region: 168-196; polyprotein (C-E3-E2-6K-E1): 214-4065; pCDW-HX45 nontranslated region: 4066-4348; pCDW-HX45 vector sequence: 4349-4385; pVAX vector sequence: 4386

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NEL-0001 Sequence Listing.txt

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NEL-0001 Sequence Listing.txt

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